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## THE EFFICIENCY OF VARIOUS ANTI-TYPHOID VACCINES *


WILBUR A. SAWYER, M.D.

Director of the Hygienic Laboratory of the California State Board of Health

BERKELEY, CALIF.


For over a year the California State Board of Health has been manufacturing at the hygienic laboratory the Gay-Claypole[1] sensitized antityphoid vaccine and distributing it free to physicians. Data cards are sent with the vaccine and physicians are requested to describe reactions and complications and to report any cases of typhoid fever in those who have been vaccinated. When the data cards are not returned, a follow-up postal card is sent. Under this system reports of several cases of typhoid fever in vaccinated persons were received soon after the beginning of the distribution. The investigation here reported was undertaken to determine whether these failures were peculiar to the type of vaccine distributed by the state board of health and also to arrive at a more accurate idea of the value of antityphoid vaccination in the civil population.

The literature on antityphoid vaccination gives little information regarding its value under the conditions of ordinary civil life. For armies there is a rapidly increasing mass of evidence. In five sets of statistics for antityphoid vaccination in the British army, both during the campaigns in South Africa and in selected test-groups of soldiers in India,[2] there were large numbers of unvaccinated men to serve as controls by indicating the extent of the exposure and the relative protection of the vaccinated men. Among the unvaccinated there were from two to seven times as many cases of typhoid fever as among the vaccinated.

Vincent[3] reports more remarkable results for various bodies of troops in the French army. The typhoid morbidity among those vaccinated with a polyvalent vaccine killed with ether varied from nothing to 0.18 per thousand men, while among the unvaccinated it ranged from 2.22 to 225.61 per thousand. In the German army in the Herero campaign in southern West Africa in 1904 to 1907 there were twice as many cases among the unvaccinated as among the vaccinated.[4]

Brilliant success with typhoid vaccination is shown in the experience of our own army,[5] the morbidity being reduced to 0.03 per thousand men with no deaths. An almost complete absence of unvaccinated men to serve as controls makes it impossible to state just how far this success is due to improvement in the vaccine and in the method of administration.

There are three important factors which determine how much vaccination will reduce typhoid fever in a community:

1. The efficiency of the vaccination, as shown by the degree of immunity produced in the individual.
2. The proportion of vaccinated individuals in the community.
3. The extent of the exposure to typhoid infection, especially of exposure other than simple contact with individuals within the community.

In analyzing the success of vaccination in our army we cannot give all the credit to the first factor, which depends largely on the kind of vaccine and the method of administration, and also on the power of the individual to respond, because like results are not being obtained by similar methods in the civil population in places where the other factors are unfavorable. In the army the second factor must play a large part, because almost all the men are vaccinated and most of the individuals with whom the soldier comes in daily contact are immune and therefore unlikely to develop typhoid fever and to expose him to contact infection. There is, therefore, little chance for typhoid fever to spread in the army through contact even if it should in rare instances gain entrance to a body of thoroughly vaccinated troops. In the civil population we find that most of our failures are in persons who have lived in the same household with typhoid patients, who have nursed typhoid patients, or who have been exposed to some heavily polluted common food or water supply. The third factor is favorable in the army, especially in time of peace, as heavy and wholesale exposure is being prevented by scientific control of food and water supplies and of the general sanitation of camps and barracks. It is obvious that we cannot expect results similar to those in our army among the civil population where the percentage of the population vaccinated is small, and the exposure to contact infection correspondingly increased, and where there is often serious neglect of the supervision of public water, milk, and food supplies.

* Read before the Section on Pathology and Physiology at the Sixty-Sixth Annual Session of the American Medical Association, San Francisco, June, 1915.

1. Gay, F. P., and Claypole, E. J.: An Experimental Study of Methods of Prophylactic Immunization Against Typhoid Fever, Arch. Int. Med., November, 1914, p. 671.

2. McWeeney, E. J.: Immunity Against Infectious Disease, with Special Reference to Antityphoid Inoculation, Lancet, London, Feb. 6, 1915, clxxxviii, 265. Firth, R. H., quoted by Russell, F. F.: Results of Antityphoid Vaccination in the Army in 1911, and Its Suitability for Use in Civil Communities, THE JOURNAL A. M. A., May 4, 1912, p. 1331.

3. Vincent, H.: La vaccination antityphoidique; résultats donnés par l'emploi du vaccin polyvalent, Jour. med. franç., 1913, vi, 417; Sur la vaccination antityphique, Jour. State Med., 1912, xx, 321.

4. Russell, F. F.: Results of Antityphoid Vaccination in the Army in 1911, and Its Suitability for Use in Civil Communities, THE JOURNAL A. M. A., May 4, 1912, p. 1331.

5. Russell, F. F.: Antityphoid Vaccination in the Army During 1913, THE JOURNAL A. M. A., May 2, 1914, p. 1371.

In the civil population, nurses have been more generally immunized than any other class. The exposure of nurses is much greater than that of the general population. Joslin and Overlander[6] have estimated that a hospital nurse is about eight times as liable to contract typhoid fever as the ordinary citizen. Various reports on the immunization of nurses give morbidities in the vaccinated ranging from nothing to 10.7 per cent. and corresponding morbidities in the unvaccinated varying from 11.4 to 35.8 per cent.[7, 8]

In epidemics, immunization of the general population has been resorted to frequently. Vincent[9] reports two epidemics, comprising a total of 712 vaccinated persons with no cases, and 2,793 unvaccinated with a morbidity of 44.4 per thousand. Townsend[7] reports an epidemic in Torrington, Conn., where there was one case of typhoid among 400 vaccinated persons. In the Sloane Hospital in New York, in a food-borne epidemic[9] due to a typhoid carrier, there were seven cases (15.9 per cent.) among 44 persons who had been vaccinated with various makes of typhoid vaccine at various lengths of time before exposure. Among 30 unvaccinated persons there were six cases (20 per cent.). Spooner[10] reports a water-borne epidemic in which sixty-five persons were exposed, of whom 29 were vaccinated during the outbreak. Among the vaccinated, one case occurred immediately after the first inoculation (3.4 per cent.). Of the unvaccinated 19 were still well at the time of the vaccinating, and five of these (26.3 per cent.) developed typhoid fever. Wade and McDaniel[11] report an epidemic in an institution, one month after the completion of vaccination of the inmates, wherein 1,396 vaccinated persons had 37 cases of typhoid (2.6 per cent.) with 3 deaths, and 304 unvaccinated had 16 cases (5.2 per cent.) with 2 deaths.

There are many reports of vaccination after epidemics, but in a considerable number of them judgment of the efficacy of vaccination is clouded by the fact that while the immunization was being performed other measures were taken to stop the epidemic, for example, the chlorination of a polluted water supply.

Statistics of vaccination among the general public, in the absence of epidemics, are meager. A total record of 26,376 such vaccinations was collected from the literature, with 9 subsequent cases, or 0.34 per 1,000. Most of these were reported in an incidental way that led to the conclusion that no special inquiry had been made to discover cases among the vaccinated.

In a small town in Kentucky[12] there were five cases of typhoid fever in persons who had, within eighteen months, been given vaccines made by at least four different commercial laboratories. About 1,000 persons in the town had been vaccinated. Russell[13] reports absence of cases in 359 vaccinated children. Among 11,772 vaccinated employees of the Canadian Pacific Railway on the western lines there were only four cases and one death.[14]

In the literature the results of vaccination, varying from apparently complete protection to almost none, bring home the fact that the immunity is relative, and that the severity of the exposure determines to a large degree whether the immunized person will escape. Vaccination seems to be more effective against infection from a slightly polluted water supply or the ordinary contacts of our daily life than against infection from a heavily infected milk or food supply or from continuous close contact with an acute case of typhoid fever.

### THE CALIFORNIA STATISTICS

To obtain information regarding the results of antityphoid vaccination in the civil population of California, a questionnaire was sent to 2,400 physicians. Replies were received from 815, and 218 of these had administered antityphoid vaccine to 8,124 patients.

In Table 1 are given the statistics so collected regarding failures to prevent typhoid fever. They are classified according to the type of vaccine and the manufacturer. All cases reported as typhoid fever and occurring at least thirty days and not more than two and one-half years after the first dose of vaccine are recorded as true failures.

TABLE 1.—ANTITYPHOID VACCINATION IN CALIFORNIA UP TO APRIL 1, 1915

| Manufacturer of Vaccine | Type | Number Vaccinated | Cases among Vaccinated | True Failures | Failures per 1,000 Vaccinations | Deaths, True Failures | Deaths per 1,000 Vaccinations |
|---|---|---|---|---|---|---|---|
| State Board of Health and University of Calif. | Gay - Claypole, sensitized | 4,927 | 32 | 21 | 4.3 | 2 | 0.41 |
| B | Sensitized | 22 | 0 | 0 | ... | 0 | |
| Make not stated | Sensitized | 18 | 0 | 0 | ... | 0 | |
| United States Army | Unsensitized | 88 | 1 | 1 | ... | 0 | |
| A | Unsensitized | 2,024 | 24 | 15 | 7.4 | 2 | 0.99 |
| B | Unsensitized | 168 | 3 | 3 | ... | 0 | |
| C | Unsensitized | 188 | 1 | 1 | ... | 0 | |
| D | Unsensitized | 15 | 0 | 0 | ... | 0 | |
| E | Unsensitized | 4 | 0 | 0 | ... | 0 | |
| F | Unsensitized | 55 | 0 | 0 | ... | 0 | |
| Four private laboratories | Unsensitized | 228 | 0 | 0 | ... | 0 | |
| Make not stated | Unsensitized | 136 | 0 | 0 | ... | 0 | |
| Make not stated | Not stated | 251 | 0 | 0 | ... | 0 | |
| Total sensitized | | 4,967 | 32 | 21 | 4.3 | 2 | 0.41 |
| Total unsensitized | | 2,906 | 29 | 20 | 6.9 | 2 | 0.69 |
| Unclassified | | 251 | 0 | 0 | ... | 0 | |
| Total | | 8,124 | 61 | 41 | 5.0 | 4 | 0.49 |

In Table 1 the letters A to E represent well-known commercial biologic laboratories. The letter F represents a municipal laboratory. In the beginning of the table are shown the statistics for the Gay-Claypole vaccine[1] manufactured and distributed at first by the department of pathology of the University of California, but after April 1, 1914, by the hygienic laboratory of the state board of health. The vaccine was made from five virulent strains recently isolated in California, and was sensitized, killed with alcohol, dried, ground, and suspended in weighed amounts in physiologic salt solution. The water-soluble substances were then removed and the sediment was again dried, weighed, and suspended. In the earlier lots of vaccine this last step was not a part of the process of manufacture, and five of the persons who later devel-

6. Joslin, E. P., and Overlander, C. L.: Separate Nursing and Isolation in Typhoid Fever, Boston Med. and Surg. Jour., 1907, clvii, 427.
7. Townsend, J. H.: Antityphoid Vaccination, Am. Jour. Pub. Health, 1914, iv, 993.
8. Ebersole, R. E.: The Value of Typhoid Vaccination in Civil Communities, Med. Rec., New York, 1913, lxxxiv, 894.
9. Ogan, M. L.: Immunization in a Typhoid Outbreak in the Sloane Hospital for Women, New York Med. Jour., 1915, ci, 610.
10. Spooner, L. H.: Antityphoid Inoculation, THE JOURNAL A. M. A., Oct. 12, 1912, p. 1359.
11. Wade, E. M., and McDaniel, O.: Observations on the Widal Reaction Following the Administration of Typhoid Vaccine, Am. Jour. Pub. Health, 1915, v, 136.
12. Gaither, J. G.: Antityphoid Inoculation, Correspondence, THE JOURNAL A. M. A., Oct. 10, 1914, p. 1314.
13. Russell, F. F.: Antityphoid Vaccination in Children, THE JOURNAL A. M. A., Feb. 1, 1913, p. 344.
14. Medical News, Canada, THE JOURNAL A. M. A., March 27, 1915, p. 1086.

oped typhoid fever received this earlier vaccine. One of these five persons received a vaccine made from a single strain instead of from the five used in the present method.

The firm A which manufactured the greater part of the unsensitized vaccine used in the cases here reported on followed in essentials the United States Army method of manufacture and used the same typhoid culture (Rawlings).

In Table 2 are shown the intervals between the administration of the first dose of vaccine and the onset of typhoid fever in those vaccinated.

In using the table it must be kept in mind that the failures do not in all instances belong to the groups of vaccinations reported. All vaccinations reported, in answers to the questionnaire, as administered up to April 1, 1915, and all failures reported in these answers or afterward by letter up to June 21, 1915, are included in the tables without regard to whether the failures belonged strictly to the particular groups of vaccinations included in the answers to the questionnaire. In some cases the failures were reported by physicians other than those who did the vaccinating, and reports of all the corresponding vaccinations could not be obtained.

In determining whether cases were true failures the interval of time was counted from the date of the first dose of vaccine, because the methods of administration were not alike. The vaccine distributed by the state board of health was given at intervals of two or three days, while most of the other kinds were administered at intervals of ten days.

The basis for determining the diagnosis was in most cases not entirely satisfactory, especially as a positive Widal reaction is not proof of the diagnosis of typhoid fever in a vaccinated person. In all cases the symptoms were regarded by the attending physician as those of typhoid fever. In six of the patients who had received vaccine from the state board of health or the University of California a culture was obtained from the blood or at necropsy and in each case the organism obtained proved to be the typhoid bacillus. Blood cultures demonstrated the presence of the typhoid bacillus in the blood of three of the patients who had received the vaccine of Manufacturer A. In a few cases agglutination tests of the patient's serum were made with paratyphoid A and paratyphoid B bacilli, but with negative results. In a number of cases the diagnosis was strengthened by the fact that there were records of positive Widal reactions in unvaccinated patients in the same group of cases of typhoid fever.

TABLE 2.—INTERVALS BETWEEN THE FIRST DOSE OF VACCINE AND THE ONSET OF TYPHOID FEVER

| Manufacturer | Interrupted Vaccinations, Two Doses Only | Early Cases, 1 to 30 Days | True Failures | | | | |
|---|---|---|---|---|---|---|---|
| | | | 30 to 60 Days | 2 to 6 Mos. | 6 to 12 Mos. | 12 to 30 Mos. | Totals |
| State Board of Health and University of California | 1 (17 mos.) | 10 | 6 | 4* | 4 | 7 | 32 |
| United States Army | ..... | ... | .... | .. | ... | 1 | 1 |
| A..... | 1 (31 days) | 8 | 4 | 3 | 5 | 3† | 24 |
| B..... | ..... | ... | .... | 1 | 1 | 1 | 3 |
| C..... | ..... | ... | .... | .. | ... | 1 | 1 |
| Total..... | 2 | 18 | 10 | 8 | 10 | 13 | 61 |

* Includes one case completely vaccinated twice, once fourteen months, and again three months before the onset, and infected in a laboratory.
† One case, a nurse, vaccinated sixteen months before the onset, gave a history of having had typhoid fever twelve years before.

In Table 3 are shown estimates of the severity of the attacks of typhoid fever in the cases classed as true failures of the vaccination.

## EXTENT OF EXPOSURE

The extent of exposure of the vaccinated persons was so very much greater than the average exposure of the citizens of the state, that in spite of the protection due to the vaccination, the typhoid death rate among vaccinated persons was considerably greater than the typhoid death rate for the state taken as a whole. This is due to the fact that most of the vaccine is sent to the parts of the state having the most typhoid fever and at the seasons of greatest exposure, when the appearance of cases warns the public of the danger of infection. The unusual extent of exposure is indicated by the fact that 824 of the vaccinated persons were nurses, most of them in charge of typhoid cases; 953 were vaccinated in the presence of typhoid fever epidemics; 28 were physicians; 15 were workers in bacteriologic laboratories; and 608 were members of households in which there were acute cases of typhoid fever. Among the 41 true failures, the vaccinated persons were exposed as follows: In 7 cases they received their infection from acute cases of typhoid fever in the same households; in 8 cases they were nurses in charge of cases of typhoid fever; in 2 cases they were bacteriologists working with virulent typhoid cultures; in 6 cases they were exposed to polluted water in water-borne outbreaks; in 5 cases they were exposed in a milk-borne epidemic; one case was that of a physician; and in 12 cases no special history of exposure was obtained. The exposures were similar in the cases of failure after the use of the sensitized and of the unsensitized vaccines. Unfortunately there is no way of estimating with any approach to exactness how many of the vaccinated persons would have developed typhoid fever if not vaccinated.

TABLE 3.—SEVERITY OF TYPHOID FEVER IN FORTY-ONE CASES CLASSED AS TRUE FAILURES

| Manufacturer | Mild | Moderate | Severe | Hemorrhage | Perforation of Intestines | Death |
|---|---|---|---|---|---|---|
| State Board of Health and University of Calif. | 12 | 3 | 6 | 2 | 2 | 2 |
| United States Army | ... | ... | 1 | | | |
| A..... | 4 | 4 | 7 | 1 | 0 | 2 |
| B..... | ... | 3 | | | | |
| C..... | ... | ... | 1 | | | |
| Total..... | 16 | 10 | 15 | 3 | 2 | 4 |

The extent of the exposure seems to be one of the most important of the factors which determine whether or not a vaccinated person will develop typhoid fever. In a food-borne outbreak like that at the Sloane Hospital in New York* vaccination seems to give inadequate protection, while in the more usual exposures of less severity, we can expect a considerable degree of protection. An instance in which vaccination was apparently of little value is furntshed by a recent milk-borne typhoid epidemic in California. On the milk-route under suspicion there were 643 persons, of whom 17 had previously received the antityphoid vaccine distributed by the state board of health. There were 23 cases in the outbreak, 5 in

vaccinated persons (three in one family), and 19 in unvaccinated people. Considering the outbreak by families, we find that there were 76 nonvaccinated families, 17 of which had typhoid fever in at least one person, and 7 vaccinated families, two of which had typhoid fever.

In a recent outbreak due to the drinking of water from a polluted well, out of twelve cases there were two in vaccinated persons. One had received the state board of health vaccine and the other had been given the vaccine of Manufacturer B.

Under the heavy exposure to typhoid fever which occurs in the civil population in various parts of the United States such occurrences as the above will take place from time to time and give rise to a distrust of typhoid vaccination unless more exact information is furnished regarding typhoid immunization in the civil population.

### COMPARISON OF THE EFFICIENCY OF THE VARIOUS VACCINES

From the table it would appear that the Gay-Claypole vaccine has greater efficiency, measured by the lower percentage of true failures, than the unsensitized vaccines considered as a group. This is not shown beyond question by the facts at hand because the two sets of figures are not exactly comparable. The methods of distributing the vaccines were different, with the result that more of the Gay-Claypole vaccine than of the unsensitized varieties was used in large groups of people, as in lumber camps and institutions. Another possible source of error is the fact that a large part of the Gay-Claypole vaccine was distributed as late as the summer of 1914 and a certain number of failures are still to be expected in the vaccinated persons reported in the questionnaire. A number of additional failures would also be expected in the persons reported as vaccinated with the other makes. It is, therefore, out of the question to draw any definite conclusions regarding the superiority of one vaccine over another, on the basis of the figures available, but the statistics seem to indicate that there is no great difference between the principal types, and that the reported failures of the vaccine manufactured and distributed by the state board of health were not due to inferiority of the vaccine issued, but rather to limitations common to the several types of vaccine administered to the American public.

### REACTIONS AFTER ANTITYPHOID VACCINATION

The severity of the reaction, as valued by the physicians who returned the questionnaire, is shown in Table 4. Observations regarding 2,695 vaccinations of university students and inmates of institutions with the Gay-Claypole vaccine by two physicians were excluded so that the figures might fairly represent a composite of the opinions of a large number of physicians. The fourth column in the table shows how many persons had reactions sufficiently severe, in the opinion of their physicians, to warrant their staying in bed for at least half a day. The classification of reactions as slight, moderate, and severe was intentionally left entirely to the physicians making the reports in order to find out their opinions regarding the amount of annoyance caused by the combined local and general reactions rather than to obtain exact observations on the phenomena. The question of severity of reaction is important when it comes to persuading the public to submit to vaccination in large enough numbers to make an appreciable reduction in the morbidity from typhoid fever.

It will be seen that the estimates of the severity of the reactions are almost alike for the sensitized and unsensitized vaccines. It was expected that the sensitized vaccines would cause distinctly less discomfort. Similar results have been obtained by E. S. Kilgore, in a series of observations, as yet unpublished and referred to here through his courtesy. Observations were made by Kilgore on the reactions of eighty-five subjects, vaccinated in four nearly equal groups. Two groups received the United States Army vaccine, obtained through the courtesy of Captain Henry J. Nichols, and two groups received the Gay-Claypole vaccine manufactured by the hygienic laboratory of the state board of health.

Of each pair of groups receiving the same kind of vaccine, one received the vaccine at two-day intervals, and the other at ten-day intervals. The reactions were measured mathematically on the basis of temperatures and measurements of the size of the local reddened area and the slight increase in circumference of the inoculated arm. The vaccines were used in the dosages recommended by their manufacturers and these were not exactly alike. Within the limits of Kilgore's tests and our inquiry no definite diminution of reaction due to sensitization was determined, unless this is indicated by the smaller number of persons (Table 4) who were sick enough to go to bed after receiving the sensitized vaccine.

TABLE 4.—REPORTS OF REACTIONS IN 5,429 VACCINATIONS

| Kind of Vaccine | Not Specified | Absent | | Slight | | Severe | | Necessitating Stay in Bed | |
|---|---|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | No. | % | No. | % |
| Gay-Claypole | 97 | 578 | 28.5 | 1,159 | 57.1 | 294 | 14.4 | 49 | 2.4 |
| A | 190 | 501 | 32.7 | 979 | 54.2 | 235 | 13.0 | 99 | 5.1 |
| B unsensitized | 0 | 61 | 38.1 | 98 | 61.3 | 1 | 0.6 | 4 | 2.5 |
| B sensitized | 0 | 16 | 50.3 | 11 | 46.7 | 0 | 0 | 0 | 0 |
| United States Army | 1 | 43 | 50.0 | 38 | 44.2 | 5 | 5.8 | 4 | 4.7 |
| C | 0 | 87 | 48.1 | 93 | 51.3 | 1 | 0.6 | 2 | 1.1 |
| D | 0 | 1 | 6.7 | 9 | 60.0 | 5 | 33.3 | 3 | 20.0 |
| E | 0 | 0 | 0 | 3 | 75.0 | 1 | 25.0 | 1 | 25.0 |
| F | 0 | 23 | 43.4 | 27 | 50.9 | 3 | 5.7 | 3 | 5.7 |
| Two private laboratories | 0 | 122 | 59.5 | 82 | 40.0 | 1 | 0.5 | 1 | 0.5 |
| Maker not specified | 190 | 98 | 24.9 | 270 | 68.5 | 26 | 6.6 | 3 | 0.7 |
| Total sensitized | 97 | 594 | 28.9 | 1,170 | 56.9 | 294 | 14.2 | 49 | 2.4 |
| Total unsensitized | 181 | 928 | 37.0 | 1,329 | 53.0 | 252 | 10.0 | 110 | 4.4 |
| Total unspecified | 190 | 98 | 24.9 | 270 | 68.5 | 26 | 6.6 | 3 | 0.7 |
| Total | 468 | 1,620 | 32.7 | 2,769 | 55.8 | 572 | 11.5 | 162 | 3.3 |

### CONCLUSIONS

1. Antityphoid vaccination is meeting a severe test in the civil population because the vaccine is most used where the exposure is greatest, and because only a small proportion of the people are vaccinated.

2. In California an inquiry has shown that the true failures were 5.0 per thousand vaccinations reported, and the deaths from typhoid fever were 0.49 per thousand. The total number of vaccinations reported was 8,124.

3. The percentage of failures indicated a slight advantage for the Gay-Claypole sensitized vaccine over the unsensitized vaccines, but the superiority was not conclusively demonstrated as the different sets of statistics were not exactly comparable.

4. There is little difference between the vaccines, sensitized and unsensitized, in common use in California with regard to the severity of reactions after inoculation.

5. If widespread and severe exposures are prevented by better supervision over public water, milk, and food supplies, vaccination can be depended on to diminish greatly the residual typhoid fever, especially if a large enough proportion of the people are vaccinated to reduce contact infection to a minimum.

## ABSTRACT OF DISCUSSION

DR. GEORGE E. ERRIGHT, San Francisco: The interesting part of Dr. Sawyer's paper consists in his comparison between the use of vaccine in the army and in the civil population. There are three things which we, as clinicians, always naturally bear in mind and consider in giving typhoid vaccine to a patient. First, there is the degree of immunity that will be accomplished. As Dr. Sawyer says, we are not able at present to establish a conclusion from that comparison. Second, is the duration of the time required for the patient to receive a complete vaccination. The sensitized serum has the advantage of requiring a shorter period of time for administration. Then there is the matter of suffering and reaction which the patient will have to undergo. There again we are not able to come to a conclusion. But there are a number of things that arise for comparison between the army and the civil population. There are in civil life a number of things that do not obtain in the army. The civil practitioner has to deal not with the healthy soldier, subject to repeated physical examination in addition to the examination which he undergoes before he joins the army, but persons as well who may be suffering from any of the chronic diseases, such as tuberculosis. From my own experience I am very loth to give antityphoid vaccine to a person with the least degree of active tuberculosis. I have seen three cases in which the reaction was unusually severe in comparison with nontuberculous people. It would be premature, however, to come to a conclusion at the present time regarding the relation of a vaccine reaction against typhoid and tuberculosis, but inasmuch as the question is still undecided, it is the part of wisdom to be conservative. Finally, it is desirable to be mindful in making comparisons between army vaccine and sensitized vaccine of the possibility of army encampments being under better general sanitary conditions and being less subject to the danger of infection than is the case in civil practice.

DR. H. J. NICHOLS, San Francisco: Dr. Sawyer's paper gives just the sort of results that I personally expected to see in the army in the course of a year or so after vaccination was introduced. I hardly expected that our results would be as good as they have been, but they have continued to be remarkable. The most recent statistics are just as good as they have been for the last three or four years. In other words, up to 1910, since 1904, we had been having between 200 and 300 cases of typhoid a year. During the Spanish War our rate was very high, but it dropped to a minimum of the number stated. Then came the results of vaccination. It is often said that sanitation has had a great deal to do with our results. I beg to differ from that opinion. I am somewhat familiar with conditions in the army, and I can say emphatically that sanitation has made no unusual advance since 1910 in the army; there have been no radical changes. Since 1910 and 1911, when vaccination became compulsory, our rates have dropped remarkably. Last year (1914) we had seven cases of typhoid fever. Four of these were in recruits who were taken into the army during the incubation period of typhoid. Three had been vaccinated, one five years before the attack, one had two doses two years previously, and one, three doses two years previously; but the majority of our cases are now in recruits who are taken in during the period of incubation. In a week or two after they enlist some men develop typhoid fever. Sometimes they have had one inoculation.

The fact is that our results are just as good today as they were when typhoid vaccination was first impressed on the public as being of great value. We have had no such bad luck as Dr. Sawyer reports in California. I do not pretend to say what his results are due to, but I do feel like emphasizing the fact that our vaccine is made with great care. It is a very simple matter, but it is made according to definte principles and they are rigidly adhered to. It is not an experiment with us any more. It is too valuable to experiment with, and we do not allow any changes to be made.

Another thing, we do not allow any vaccine to be used after four months. A great many of the commercial houses are allowed by law to put a year's limit on the vaccine. I do not know what effect this may have had in Dr. Sawyer's results. Again some persons receive only one dose or two. Our men take three doses, or they hear from us. All these factors are to be considered. Of course we are all in the same boat and the same principles must hold inside or outside of the service. I do not feel, however, that the explanations which are given for our success, such as lack of exposure, etc., are at all conclusive. Our men certainly are subject to the same infection that anyone is. Our soldiers go down town and go into restaurants, and everywhere they are subject to the same contamination as any other citizen. I cannot help believing myself, personally, that our vaccine is somewhat superior to the vaccines in general use. At any rate, the fact is that we have not had any such setback as is mentioned by Dr. Sawyer.

DR. E. S. KILGORE, San Francisco: It is unfortunate that it was not possible to obtain reliable returns from another 8,000 unvaccinated subjects living in the same communities and under the same conditions as those included in this analysis. They would be the only group with which it would be fair to compare these results, and for reasons given in the paper they would undoubtedly have shown a much greater morbidity than the population at large. As it stands, the sensational fact which will stick in the mind of the ordinary reader is that there is actually more typhoid fever among the civil population who have received antityphoid vaccination than among those who have not. This impression will be false and dangerous unless the reasons for it given in the paper are duly appreciated. A factor not mentioned by Dr. Sawyer which may account for some of the morbidity among vaccinated subjects is the feeling of security which they have and the consequent relaxation of hygienic measures they would otherwise employ. The feeling has been widespread that antityphoid inoculation is a sure preventive, and the individual who considers himself already safe will not take troublesome precautionary measures. Therefore, an important practical lesson to be taken from this paper is that whenever we immunize people against typhoid fever (or any other infection) particular pains should be taken to make them understand that the protection conferred is not absolute and does not remove the necessity for ordinary hygienic precautions. In view of the presumable necessity of vaccinating every two or three years in order to maintain protection against typhoid, the question of relative severity of reactions following subsequent vaccinations has some importance. Some have been restrained from revaccination on account of the prevalent idea that later vaccinations produce greater discomfort than initial ones. Our experience at the University of California Hospital is that this is not true about as often as it is true, and that the average reactions from first and from later inoculations is practically the same.

DR. L. B. WILSON, Rochester, Minn.: At the meeting of the Colorado State Medical Society last September, Jolley reported the results obtained by the use of typhoid vaccine in the National Guard while encamped during a strike in immediate proximity to a village in which a large number of cases of typhoid were occurring among private citizens. I do not remember the exact figures, but my impression is that the results were excellent, though there was abundant opportunity for the vaccinated men to become infected.

DR. W. A. SAWYER, Berkeley, Calif.: I believe with Dr. Nichols that antityphoid vaccination was a very important

factor, perhaps the most important single factor, in the astonishing success in the reduction of typhoid fever in the army. If it is claimed that the vaccine used in the army is superior to the vaccines manufactured by commercial houses which follow in their way the methods of the army laboratories, I wish it could be arranged that a large amount of the army vaccine, say enough for 10,000 people, could be distributed for use in the civil population of California. Then we should soon know whether the vaccine of the army is more efficient than the material now in use. If it is, the fact should be ascertained as soon as possible, so that the public will receive the most efficient antityphoid vaccine which can be manufactured.

## THE CHOICE AND TECHNIC OF THE ANESTHETIC

ARTHUR DEAN BEVAN, M.D.
CHICAGO

It is the purpose of this paper to analyze the many existing methods of anesthesia with the object of determining if possible in a judicial way what anesthetics should be selected and what technic should be employed in a general surgical clinic. In making this analysis and in arriving at conclusions, we have been controlled by certain requirements: first, the safety of the patient; second, the comfort of the patient; third, the efficiency of the anesthetic agent; fourth, control, avoiding anesthetics which cannot be withdrawn with the first appearance of danger; fifth, the simplicity and general adaptability of the method; sixth, after-effects on blood tissues and viscera; seventh, complications, vomiting, etc., and eighth, effects on immunity against pus organisms, pneumococci, etc.

This study is based on the special interest devoted to this subject in my own clinic by myself and assistants, Drs. Isabella C. Herb, Hamburger and Ewing, Evarts Graham, B. F. Davis, and F. B. McCarty, on pieces of laboratory research which we have carried on, on observations made in the clinics of others both in this country and abroad, and from a study of the literature. The last ten years have been very active ones in the field of anesthesia. New and better means of local anesthesia have been introduced. The use of nitrous oxid has been gradually extended, especially in this country. Complicated apparatus, mixtures and sequences have been widely employed. The use of scopolamin and morphin and various substitutes for morphin, pantopon, narcophin, etc., have been given an extended trial. The intralaryngeal method has been developed by Meltzer and Auer. Spinal anesthesia, nerve blocking, and intravenous and rectal anesthesia have enthusiastic supporters, and have been employed in large series of cases. We have during this period seen in this country the gradual development of the trained anesthetist as a member of the surgical team. So much work has been done that it would seem that we have at hand enough evidence to determine what are the best and safest anesthetics, and in what particular fields each should be employed. Such an analysis would necessarily cover a very wide field, and in this brief paper it will be possible to present simply the essential facts of this study of each of the agents and the methods.

I began this study with the intention of securing for my own clinic methods of anesthesia which would cover fully the entire surgical field, which would be the safest, most efficient, the most satisfactory to both patient and surgeon, the simplest and least complicated. I desired also to find anesthetics which could be adopted and employed by medical men generally, as my clinic is a teaching clinic for medical students, and part of their instruction is the giving of anesthetics. From this standpoint I have analyzed the following:

1. Chloroform.
2. Ether.
3. Nitrous oxid gas.
4. Scopolamin and morphin.
5. Spinal anesthesia.
6. Blocking.
7. Infiltration.
8. Intravenous, general and local.
9. Intrarectal.
10. Intratracheal.
11. Intrapharyngeal.
12. Mixtures.
13. Sequences.
14. Anociassociation.

In each instance we have analyzed these agents and methods from the standpoint of:

1. Safety.
2. Comfort.
3. Efficiency.
4. Control.
5. Simplicity and general adaptability.
6. After-effects on blood and tissues and viscera.
7. Complications, vomiting, etc. Paresis of bladder and bowels.
8. Effect on immunity to pus organisms, pneumococcus, etc.

As a result of this study I submit the following brief summary:

### CHLOROFORM BY INHALATION, OPEN DROP METHOD

1. Safety: The most dangerous of all inhalation anesthetics. Deaths from one in 1,000 to one in 3,000 on the operating table.

2. Comfort: A most agreeable anesthetic to the patient.

3. Efficiency: The most efficient anesthetic. Anesthesia and relaxation profound and complete.

4. Control: The anesthetic can at once be stopped on the appearance of danger signals, but the chloroform already in the system cannot be rapidly eliminated, and the effects persist for a considerable period. The margin between the required anesthetic dose and the toxic dose is too narrow for safety.

5. Simplicity and general adaptability: All that could be desired.

6. After-effects on blood tissues and viscera: Reduces hemoglobin. Produces often what is now generally recognized as late chloroform poisoning with fatty degeneration of liver, kidneys and muscle tissue which is usually fatal.

7. Complications: Vomiting in about one third of the cases. Lung complications and nephritis in a small percentage.

8. Effects on immunity: Reduces resistance against pus organisms, pneumococcus, etc.

*Conclusion.*—Because of its efficiency, comfort and simplicity it has probably been employed more generally the world over than any other anesthetic, possibly more than all other anesthetics combined. And yet the time has come when chloroform in spite of its many advantages should be absolutely and finally discarded because of the huge mortality attending its use

both on the operating table and the late chloroform deaths, and because we have for all classes of surgical cases efficient and much safer agents. It is possible that in military surgery chloroform may still find a legitimate place.

ETHER BY INHALATION, OPEN DROP METHOD

1. Safety: The safest anesthetic agent known for prolonged anesthesia. Deaths from one in 5,000 to one in 10,000.

2. Comfort: Not an agreeable anesthetic to take, especially by the closed methods; much more agreeable in expert hands by the open drop methods.

3. Efficiency: Very efficient; complete anesthesia and relaxation can be obtained.

4. Control: The anesthetic can be stopped on danger signals, and the agent fairly rapidly eliminated if necessary under artificial respiration. The margin of safety between the anesthetic dose and the toxic dose is wide.

5. Simplicity and general adaptability by the open drop method is all that could be desired.

6. Reduces hemoglobin, slightly increases coagulability of the blood, and produces few if any cases of injury to liver, kidneys and muscle tissues such as occur from chloroform.

7. Vomiting in from 30 to 40 per cent. of cases. Lung complications and nephritis in a small percentage of cases.

8. Reduces slightly resistance against pus organisms and pneumococci, etc.

*Conclusions.*—Ether by the open drop method is the safest general anesthetic known for producing prolonged anesthesia. It should be today the standard anesthetic in the surgical clinic. The discomfort of ether anesthesia when properly given by the open drop method by an expert can usually be practically eliminated. In the few cases in which the repugnance to ether is great, the sequence of gas-ether can be employed.

The closed method of giving ether is not so satisfactory or so safe as the open drop method. Complicated apparatus to control the percentage of ether and to warm ether possess no advantages over the simple drop method, and should be discarded. The giving of ether by the drop method is an art which must be acquired under the instruction of an expert.

NITROUS OXID GAS

1. Safety: Gas for short anesthesias, such as pulling teeth, opening abscesses, etc., is the safest anesthetic known. In prolonged anesthesias, a half hour or more, gas is now known to be more dangerous than ether. I refer now to the use of gas and ether in the hands of experts. In nonexpert hands, gas in prolonged anesthesias is much more dangerous than ether.

2. Comfort: Gas is the most agreeable inhalation anesthesia.

3. Gas is not an efficient anesthetic, such as chloroform or ether. Complete anesthesia and complete relaxation for prolonged periods are difficult to maintain, and are not possible in a considerable percentage of cases.

4. Control: Gas can at once be stopped at danger signals, and the agent already in the system is rapidly eliminated more rapidly than any other agent.

5. Simplicity: The apparatus for giving gas is not very complicated, more so, however, than that used in giving ether and chloroform. It is not so widely adaptable as ether. The apparatus is heavy and cumbersome, and somewhat difficult to transport. This objection can usually be overcome.

6. After-effects on blood tissues and viscera, practically negative.

7. Vomiting occurs in but a small percentage of cases.

8. It has little or no influence on immunity.

*Conclusions.*—Gas should be one of the general anesthetics employed in the surgical clinic. Its place should be for short anesthesias in which unconsciousness is desired and local anesthesia is not applicable—in reducing fractures and dislocations, opening abscesses, and in some more prolonged operations in which for special reasons gas becomes safer than ether, such as operations on the urinary organs with kidney insufficiency. A surgical clinic which does not frequently employ gas anesthesia is, from the standpoint of anesthetics, a poorly conducted clinic.

SCOPOLAMIN AND MORPHIN AS AN ANESTHETIC

1. Safety: A very dangerous anesthetic, so dangerous that it has now been generally discarded by general surgeons, and is retained only by a few enthusiastic obstetricians, the Freiburg school, and has been exploited as the "twilight sleep." The exploitation has been not only in medical journals but also in the lay press. A very thorough research on scopolamin and morphin has recently been completed by the obstetric staff of the Michael Reese Hospital in Chicago and reported by Baer.[1] This investigation shows that scopolamin and morphin should be rejected absolutely and finally as too dangerous, not efficient and as complicating the process and as threatening the asepsis, in short, the same conclusion that was arrived at by general surgeons some time ago. After scopolamin and morphin had caused a good many deaths, scopolamin and pantopon was substituted, and for a time it was claimed that this combination eliminated the risks; very soon, however, fatalities began to be rapidly reported. Then scopolamin and narcophin were suggested as a safe combination. This has not been employed as yet in a large enough series to warrant final conclusions, but deaths are already being reported, and there is no strong reason to hope that this combination is safer than its predecessors.

2. Comfort: No discomfort beyond the giving of the hypodermic injection.

3. Efficiency: Not efficient. It must be followed by a general anesthetic in a large proportion of cases.

4. Control: After once injected, it is beyond the control of the surgeon, and if a dose has been given which is toxic to that particular patient, little can be done to eliminate it.

5. It is simple and could be generally adopted.

6. After-effects on blood tissues and viscera are slight.

7. Complications: Delirium sometimes of serious character is not uncommon. Patients are frequently so dopey and out of their heads that they cannot cooperate with the surgeon or obstetrician.

8. Reduces immunity to pus microbe organisms.

1. Baer, J. L.: Scopolamin-Morphin Treatment in Labor: A Critical Analysis of Sixty Cases, THE JOURNAL A. M. A., May 22, 1915, p. 1723. Baer says that the excessive thirst, headaches which are so distressing, the difficult control of patients, the risks of infection from soiling, the blurred vision, the ghastly deliriums constitute so severe an arraignment that "we feel compelled to condemn it."

### SCOPOLAMIN AND MORPHIN PRELIMINARY TO ANESTHESIA

As a general anesthetic, scopolamin and morphin are to be absolutely and finally rejected both from general and obstetric practice. After it was generally agreed that scopolamin and morphin were too dangerous for use as an anesthetic, an extended trial of routine small doses of scopolamin and morphin preceding the general anesthetic were made, especially in Germany. The sequence has been responsible for many deaths. The evidence from the literature shows beyond question that even in small doses ¼ grain of morphin and 1/150 grain of scopolamin before chloroform, ether or gas adds distinctly to the risks of the patient. It complicates the giving of the general anesthetic. It masks danger signals. It adds to the percentage of vomiting and inability to void urine. It carries with it no advantage and many disadvantages and should be rejected. It is not a good thing, it is not a kindness to a patient to bring him to the anesthetizing room dopey and flighty. For some time after we had finally rejected scopolamin and morphin before a general anesthetic, we continued to employ it before using local anesthesia. We have now discontinued it even before local anesthesia, and find our results much more satisfactory and the local anesthesia quite as complete. In using local anesthesia, one must have the cooperation of the patient, and this one can have better with the patient in normal condition than when he is dopey. We have been pleased to find also that the occasional vomiting which occurred after our local anesthesias has practically ceased since discontinuing scopolamin and morphin, and that in our hernia operations the inability to void and the necessity to use a catheter does not occur. Preceding either the general or the local anesthesia, morphin and scopolamin should be rejected.

It is, of course, frequently necessary to use morphin on account of pain in surgical cases which later require operation under anesthetics, and where the indications are clear, morphin should not be withheld because the patient is to be given an anesthetic. The anesthetist should be informed of the fact that the patient has had morphin.

### SPINAL ANESTHESIA

1. Safety: Very dangerous; more so than chloroform. Nine deaths occurred in the first 1,000 cases, and although it is difficult to give absolute statistics, there is probably more than one death in 500 cases.

2. Comfort: Not a comfortable thing, especially to an intelligent man who realizes what is being done. Few medical men with their knowledge of anatomy would choose spinal anesthesia in their own case.

3. Efficiency: The least efficient of the anesthetics except scopolamin and morphin. Necessary to supplement it with other means in from 5 to 10 per cent. of cases.

4. Control: When once injected, the agent is beyond control, and if the dose is a toxic one, the surgeon is helpless.

5. Simplicity: The method is not simple; it requires special technic and could not be generally adopted.

6. After-effects on blood tissue and viscera: These are largely expanded on the cord, and appear as cord injuries—the so-called aseptic meningitis.

7. Complications as above, and especially persistent and severe headaches lasting for days and weeks.

8. It has no effect on immunity.

That anesthesia can be produced by injecting cocain and its substitutes into the cerebrospinal fluid of the cord is an interesting fact. The method, however, has no place in surgical practice. It is too dangerous to warrant its employment, and for every surgical condition requiring an anesthetic, we have safer and more efficient methods at our disposal.

### BLOCKING

By blocking I mean the attempt to anesthetize the field of operation by infiltrating the nerve supply of the part proximal to the site of operation, as blocking the gasserian ganglion, the brachial plexus, the great sciatic and anterior crural, the internal pudic, etc.

1. Safety: The method with good technic is fairly safe, except for such accidents as serious lesions from attempting to block the gasserian ganglion with resulting intracranial injury, injury to the vessels in blocking the brachial plexus, and more or less persistent paresis or paralysis of the nerve attacked from the direct trauma.

2. It is not a comfortable method. I have seen patients tortured in the attempt to block the gasserian ganglion, the brachial plexus and the internal pudic. The fact that the blocking of the nerve is often itself a surgical procedure is an objection to the method.

3. Efficiency: It is not always successful in producing anesthesia. Usually from fifteen to twenty minutes are required to produce full anesthesia, and in a considerable percentage of cases it is necessary to supplement it with other forms of either general or local anesthesia.

4. When once injected, the agent is beyond control; but inasmuch as the dose employed is or should be never toxic, this is not a serious objection.

5. Simplicity: The method is not simple; it requires often special training and technic, as in gasserian ganglion, brachial plexus, etc. It could not be generally adopted.

6. After-effects on blood tissues and viscera, nil.

7. Complications, vomiting, etc.: The method is free from them.

8. Effects on immunity, nil.

Blocking has but a limited field. Blocking of the gasserian ganglion, brachial plexus, etc., should be rejected. These are in themselves important surgical procedures, and cannot compete at all with the simpler and safer methods which we have at our disposal. In dental surgery the blocking of the inferior dental and branches of the superior dental nerves has a very useful field. As a rule, nerve blocking should be limited to the blocking of nerves which appear in a dissection made under local infiltration anesthesia, as blocking the ileo-inguinal nerve in a hernia operation done under local anesthesia.

### LOCAL INFILTRATION ANESTHESIA

We have in infiltration anesthesia since the introduction of novocain and epinephrin a most important addition to our anesthetic agents.

1. Safety: Very safe when proper agents are employed and the technic is aseptic. Novocain in diluted doses of from 0.25 to 0.5 per cent. in normal salt with the addition of a proper amount of epinephrin seems to be very safe. From 6 to 8 ounces or even

more of this solution can be safely employed. In using small amounts of the solution, say, 1 or 2 ounces, 1 drop of 1:1,000 epinephrin should be added to each 200 drops of the 0.5 per cent. novocain in normal salt solution; in using larger amounts, from 6 to 8 ounces, not more than 20 drops of epinephrin should be used. I can find no report of a fatality from 0.25 or 0.5 per cent. of novocain. The addition of the epinephrin is most important. It produces a local anemia which prevents rapid absorption, and therefore makes the effect both safer and more prolonged. The epinephrin also reduces the bleeding to surprisingly small proportions.

A very definite warning should be given in regard to the use of epinephrin in too great concentration. Epinephrin in what is apparently a very weak solution is capable of producing necrosis of the tissues. I have seen this occur with the use of the tablets that are so frequently employed containing both novocain and epinephrin. It is not safe to use the tablets as ordinarily put up in any extensive operation, and these tablets should be very generally discarded and a definite warning sounded against them. I have seen no necrosis when the epinephrin has been 1:100,000, that is 1 drop to 100 drops of the novocain solution. I believe on the whole, however, that a safer rule would be 1:200,000, that would be 1 drop to each 200 drops of the novocain solution. This would be 10 drops in 4 ounces or 20 drops in 8 ounces, which might be regarded as the maximum amount to employ.

2. Comfort: If the technic is good, the anesthesia carries not more discomfort than the use of a hypodermic injection of morphin. In all cases one should inject first with a fine hypodermic needle 20 minims of the solution before using the larger needle and syringe. I tell a patient on whom I am doing an extensive lip carcinoma operation that I will promise him that he will have no more discomfort than from having a tooth filled.

3. Efficiency: With the large amounts of solution which can now be safely used, we can absolutely anesthetize the tissue infiltrated, and the anesthesia comes on at once and persists for from thirty to forty-five minutes.

4. Control: The agent after once being injected is no longer under complete control. Some control is retained, as operating on an extremity a rubber bandage is placed above the injection and free incisions would enable one to prevent rapid absorption and remove part of the fluid. I have, however, never seen any toxic symptoms or any necessity to resort to such methods.

5. Simplicity: The method is very simple and can be generally adopted.

6. After-effects on blood tissue and viscera, nil.

7. Complications, vomiting, etc.: Since we discontinued the scopolamin and morphin before our local operations, vomiting has practically disappeared. I have to report one incident which occurred in my series of cases. A week after operation for a benign breast tumor, a young girl had a thrombus of the axillary vein on the side opposite to operation. This cleared up in a few days, was painless and may or may not have been due to the local anesthesia.

8. Immunity not influenced.

*Conclusions.*—I believe that in local anesthesia with novocain and epinephrin we have a very safe and satisfactory method which should be employed in a large group of cases. Wilms is using it in a majority of his operations in the Heidelberg clinic. I am not prepared to go that far. I do not believe that the range of local anesthesia should be stretched too far. I am using it in about 30 per cent. of my cases.

### INTRAVENOUS ANESTHESIA WITH ETHER

1. Safety: Both clinical and laboratory work shows that it is a dangerous method. Clairmont and Denk, after careful experiments on dogs, have concluded that it is too dangerous to employ in clinical work. Kuttner has two cases of lung embolism in twenty-three cases.

2. It is an agreeable anesthetic, as it does away with the disagreeable odor and irritation of inhalation of ether.

3. It is efficient, but the border line between anesthesia and a toxic dose is too narrow.

4. When once injected into the circulation, it is beyond immediate control.

5. The apparatus and technic are complicated and require special watchfulness. It could not be generally adopted.

6. After-effects are much the same as in the case of ether inhalation.

7. Complications are the same as with ether inhalation.

8. Effect on immunity is the same as with ether inhalation.

*Conclusions.*—Too dangerous, too complicated, no special advantages, should be rejected.

### LOCAL INTRAVENOUS ANESTHESIA WITH COCAIN AND SUBSTITUTE FOR COCAIN

This was introduced by Bier and is an interesting piece of experimental work. It is a complicated method, however, requiring usually the exposure of a vein, and the distress of two tight rubber bandages above and below. It has no special advantages and should not be adopted as a practical method.

### INTRARECTAL ANESTHESIA

This is an old method introduced as early as 1847 and revived from time to time.

1. Safety: It is not a safe anesthetic.

2. Comfort: It is not a comfortable method of taking ether.

3. Efficiency: It is not very efficient.

4. Control: Much the same as with intravenous anesthesia.

5. Simplicity: The method is complicated and cannot be generally adopted.

6. After-effects on blood and tissue same as inhalation anesthesia.

7. Complications: Distention of bowels, very severe local irritation of colon with colicky pains and bloody diarrhea often fatal.

8. Effect on immunity same as ether inhalation.

*Conclusion.*—Rectal anesthesia should be rejected.

### INTRATRACHEAL ANESTHESIA

This interesting method, introduced by Meltzer and Auer, has not as yet been used in a very large series of cases.

1. Safety: Robinson collected 1,400 cases with seven deaths, one from lung rupture and one from emphysema.

2. Comfort: The same as drop ether which precedes the intubation.

3. Efficiency: It is an efficient method.

4. Control: The same as with drop ether.

5. Simplicity: It requires a complicated apparatus. It requires first anesthesia by drop ether and then a change to intubation. It could not be generally adopted.

6. After-effects same as drop ether.

7. Complications same as drop ether.

8. Effect on immunity same as drop ether.

*Conclusions.*—The method is dangerous. It is complicated and it possesses advantages in very few cases. When it was introduced it was welcomed as a simple method which had all the advantages of the complicated differential pressure methods which had been experimented with in thoracic surgery. As a matter of fact, both the complicated differential pressure and the intratracheal methods have practically been largely eliminated as a result of further investigations in thoracic surgery, which have demonstrated the fact that most of the operable cases in thoracic surgery can be done either under local anesthesia or drop ether or gas and oxygen; that the necessity of preventing collapse of the lung when but one pleural cavity is opened was theoretical and not real, and lastly, by the fact that the extensive work in which both pleural cavities are involved and such extensive work as attacking the thoracic part of the esophagus can not as yet be accepted as warrantable surgical procedures; furthermore, the introduction of the simpler method of intrapharyngeal anesthesia has eliminated the intratracheal method from the field of head surgery, in which for a time it seemed to have a place. On the whole, therefore, intratracheal anesthesia has little place in practical surgery.

### INTRAPHARYNGEAL ANESTHESIA

This is an old method introduced years ago and reintroduced from time to time with changes in apparatus. Souchon developed a simple apparatus. A catheter was introduced through the nose or mouth into the pharynx, and with a hand bulb ether vapor was introduced. Potts, one of my assistants, invented a simple foot bellows to drive the ether vapor. Dr. Isabella Herb has made an apparatus in which the ether vapor is forced by a small air pump driven by an electric motor, taking its power from the ordinary electric light plug. The special advantage is that in mouth and jaw work after the patient has been anesthetized by drop ether, the mask can be removed, the catheter introduced into the pharynx through the nose or mouth and anesthesia continued without interfering with the operative field.

1. Safety: It is about as safe as drop ether.

2. Comfort: The same as drop ether, which it succeeds.

3. Efficiency: Not quite as efficient as drop ether but nearly so.

4. Control: Same as with drop ether.

5. Simplicity: It can be operated with a hand bellows, but better by an electric pump, if this is kept up in perfect working shape. It can be fairly generally adopted for use in mouth and jaw work.

6, 7 and 8. After-effects, complications and effect on immunity: Same as with drop ether.

### MIXTURES AND SEQUENCES

There has been somewhat of a tendency, especially on the part of some professional anesthetists, to introduce in their work special mixtures and sequences, and complicated apparatus. I believe that, on the whole, anesthetic mixtures like the old shotgun prescriptions of the past should be avoided, and the patient's life should not be jeopardized by the administration of two or more powerful poisonous agents at the same time, one of which might intensify the action of the other or mask the ordinary danger signals. The sequences which I think should be accepted not as a routine but for special cases are the sequence of gas and ether, and local infiltrations supplemented with short gas anesthesia during some painful manipulation. The complicated apparatus to measure the percentage of ether and to warm ether possesses no advantages and should be relegated to the scrap heap. My assistants, B. F. Davis and F. B. McCarthy, who have gone into this matter fully and will shortly report on their work, summarize their results as follows:

### WARMED ETHER IN ANESTHESIA

The amount of heat required to warm ordinary ether vapor as used in anesthesia by the open or closed methods by intrapharyngeal or intratracheal insufflation to body temperature is so small as to be a negligible factor in lowering body temperature and inducing shock in anesthetized patients. During an hour's anesthesia with the coldest ether vapor, one is likely to obtain, say, 8.5 C.; the heat used in warming the anesthetic is equal to that lost in climbing up 75 feet of stairs, and this spread over the entire hour. No more mucus and saliva is secreted when anesthesia is induced and maintained with cold than with warm ether. So-called cold ether vapor does not appear to be more irritating to mucous membranes than warmed ether. The quantity of ether required to produce and maintain anesthesia does not appear to be materially influenced by warming ether. The warming of ether vapor, however administered, is accomplished in the mouth, pharynx and trachea, and the anesthetic reaches the alveoli at body temperature.

It has been shown that with percentage-measuring machines there is danger of continuing too long the high percentage vapor, that is, the anesthetist watches the dial of his machine and not the patient. A jar which will allow air to be passed over the ether, through the ether, carried over the ether without coming into contact with it at all, or any combination of the foregoing routes is easily constructed, cheap and satisfactory. The rate of administration of the anesthetic may be governed by the same guides as in the drop method.

There appears to be no reason for the adoption of any of the expensive and more or less complicated ether-warming or percentage measuring machines which are offered for sale.

### ANOCIASSOCIATION

We are all familiar with the interesting work which Crile has been doing under his so-called anociassociation method. When I heard Crile present the subject I was greatly interested. When I saw his brilliant work in his operating room I was delighted with his technic and his admirable surgical methods in general. No one can find fault with Crile's general statement that "the prevention of shock in operations under

inhalation anesthesia is, as it seems to me, most effectively accomplished by the conservation of the energy of the patient, by the prevention of the loss of heat, loss of blood, the exclusion of psychic influences, a minimum trauma of sensitive tissue, by a feather-edge dissection," etc. But when he adds that he can wholly prevent shock by sequestering the brain from the field of operation by blocking the nerves with novocain, we cannot accept either his assertion or the experimental work on which this is based.

To begin with, none of us know what shock is. Physiologists who have devoted much time and study to the subject are not agreed among themselves as to just what shock is, and most of them admit that they do not know. Many of them have repeated Crile's experimental work, and practically none of them accept his theory or his results.

As examples I submit the following conclusion of experimenters who have investigated this subject:

JANEWAY and EWING:[2] If trauma to the sensory nerves is a factor in production of shock in an unconscious animal, it is wholly subsidiary to other factors, and it is questionable whether it was apparent in our experiments even when these other factors had rendered the nerve centers more vulnerable by toxic influences, as ether, or by a fall in blood pressure.

PORTER and QUINBY:[3] The symptoms of shock are a clinical entity about which there can be little dispute. Shock, on the contrary, is a pathological state, the data of which are at present hypothetical. The hypothesis which constitutes the hitherto generally accepted definition of shock declares that the vasomotor cells are depressed, exhausted and inhibited by excessive stimulation of afferent nerves; the fall in blood pressure and the accompanying symptoms are the result of this depression. The experiments cited in this paper demonstrate that the vasomotor cells are not thus depressed or inhibited, and experiments published in the last number of this journal show that excessive stimulation of afferent nerves does not materially lessen the blood pressure. The present hypothetical basis of shock is thus removed.

SEELIG and LYON:[4] In conclusion, it is important again to emphasize the fact that the experimental work detailed in this paper is in no sense of the word to be taken as an explanation of the causative factor or factors of shock. Just as Porter claims to show explicitly that in shock the vasomotor center is not exhausted, and therefore implicitly that the peripheral vessels are not paralyzed, so we try to show explicitly that the peripheral vessels are contracted and implicitly that not all the vasomotor centers can be exhausted. The complexity of the vasomotor apparatus with its multiplicity of centers and the seemingly independent action of many of these centers, render it impossible to frame a satisfactory theory based on our results. This much may be said with assurance: If the work herein detailed stands the test of confirmation, then the doctrine that shock is due to vasomotor exhaustion must be revised.

MANN:[5] It is impossible to reduce the anesthetized animal to a state of shock by any degree of sensory stimulation, provided all hemorrhage is prevented and its abdomen is not opened.

After analyzing Crile's work and the work of competent physiologists, I have been forced to the conclusion that there is no scientific basis for Crile's statement that he can wholly prevent shock by sequestering the brain from the field of operation by blocking the nerves with novocain. Crile's excellent surgical work is done not because of anociassociation but in spite of it.

The complicated sequence of scopolamin and morphin, gas, oxygen, ether, novocain and quinin and urea hydrochlorid is a method open to many objections. The scopolamin and morphin, as I have attempted to show in this analysis, add distinctly to the risks of the patient and should be omitted. The gas-oxygen plus ether, if used alone, is an acceptable anesthetic sequence, but not so safe as a routine as drop ether and gas and oxygen used alone in properly selected cases. Novocain used alone in infiltration anesthesia is of great value and has a wide field of usefulness. Used in this sequence it has little value, certainly none in preventing shock. Quinin and urea hydrochlorid has no value in this sequence, and used alone as an anesthetic cannot compete with novocain and epinephrin. I believe, therefore, that we must reject both the theory and the practice of anociassociation.

## CONCLUSIONS

The final results of my analysis of the anesthetic problem are as follows:

1. Drop ether should be today chosen as the standard general anesthetic when a prolonged anesthetic is desired with relaxation and unconsciousness.

2. Intrapharyngeal ether should be chosen in mouth and jaw cases when it is desirable to remove the anesthetist and the anesthetic apparatus out of the operative field.

3. Gas should be chosen in short anesthesias in which unconsciousness is desired, and in special cases, such as kidney insufficiency.

4. Local infiltration anesthesia should be chosen when the surgeon has the full cooperation of the patient and when the field of operation can be completely infiltrated and anesthetized by a safe amount of novocain and epinephrin.

These four simple and safe methods can be made to cover all surgical cases. This places anesthesia on a very unpretentious, simple basis, but here as in most fields of surgery, we finally learn that simplicity is near to truth.

122 South Michigan Avenue.

2. Janeway and Ewing: Ann. Surg., 1914, lix, 158.
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**The Control of Communicable Diseases.**—The monthly *Bulletin* of the State Department of Health of New York makes this subject the chief feature of the September issue. It points out that the loss of life from typhoid fever, diphtheria and scarlet fever remains too high. These three infections, together with measles and whooping cough, were responsible for the deaths of over 5,000 people, mostly young children, in New York State last year. This issue of the *Health News* contains an account of four outbreaks of communicable disease. Septic sore throat in Westchester County was spread by contact and secondarily to a slight extent by milk; scarlet fever in Dutchess County was spread primarily by milk and secondarily by contact; diphtheria in Rockland County, by milk, and in Westchester County, by contact. Therefore, the remedies which would guard against such outbreaks are simple—pasteurization of milk and isolation of early cases of disease. These four epidemics included nearly 1,400 cases of disease. From this experience the following lesson is emphasized: 1. Unpasteurized milk is unsafe to consume. 2. Local health departments can prevent outbreaks of this kind by requiring the pasteurization of milk before delivery to consumers. 3. In the presence of scarlet fever all cases of sore throat should be treated as septic sore throat, which is reportable to the local health department.

# PROJECTILE WOUNDS OF THE HEAD

## EXPERIENCES DURING RECENT SERVICE IN AUSTRIA, WITH PARTICULAR REFERENCE TO WOUNDS OF THE EYES *

LLOYD MILLS, M.D.
LOS ANGELES

The material for this paper is drawn from over 300 cases in my own wards of the Vienna General Hospital, where, after serving for four months as voluntary assistant in the Fuchs clinic, I was given charge of two wards of this service, these wards being devoted to the care of the wounded and especially of eye and head injuries. I was further able to observe and to assist in the surgery of over 800 other wounded in the associated wards of Professor Büdinger's service, among whom were a number of face and head cases. From army surgeons among these patients, I was also fortunate in gleaning much interesting matter relative to the rapidly fatal wounds seen on the firing line.

In the first month of the war comparatively few head injuries were received, because the fighting was in the open; but with intrenchment operations on a large scale, the number rose rapidly.

Because of the position of the men in the trenches, wounds of the head are probably the most frequent of all injuries, their frequency being masked in the hospital lists of wounded by the fact that fully 95 per cent. of all short-range wounds of the head are immediately fatal because of the literal ruin which the modern sharp-nosed bullet makes of the cranium and its contents.

Facial wounds are very common and may be serious if the eyes are involved, or if the mastication is impaired through damage to the jaws or their articulations. The central part of the face, however, may be traversed in all directions by undeformed bullets, with the tissue destruction practically limited to the bullet's path because of the spongy nature of the bone, and this, apparently, without regard to the velocity of the missile. Infection of the sinuses is the rule when they are perforated, but when the splinters of bone are removed and free drainage provided, healing takes place with unusual rapidity. The lower jaw frequently suffers extensive comminution because of its compact structure, and the fragments of bone and the dislodged teeth often act as infecting secondary missiles or tear away considerable portions of the lower face.

Some idea of the terrific impact of the modern spitzer bullet may be gained, when it is understood that the 10-gram German bullet has a muzzle velocity of about 2,900 second-feet, and revolves on its long axis, its boring and chief pathologic motion, about 2,500 times per second. In terms of energy, this means that at 100 yards, the bullet has a working force capable of raising a weight of over three quarters of a ton to a height of one foot, and at 300 yards a half-ton would be raised an equal distance, while at 500 yards the force drops to about 600 foot-pounds. Consequently, it becomes obvious why so few of the short-range bullet wounds of the cranium figure in the lists of the base and reserve hospitals.

Reconstruction of skulls shattered by the modern pointed bullet shows that the undeformed bullet passes completely through the skull and emerges before the collapse of the cranium occurs. Until very recently this collapse was supposed to be due to a so-called "explosive action" of the missile, but careful reconstructions show that radial and circular fissures arise from both the wound of entrance and that of exit and so interlace that finally the cranial dome becomes converted into a myriad of fragments. These fragments tumble into the general ruin and are dissipated far and wide through the transmission of the energy of the bullet to the brain substance, which spreads and storms out through every fissure. When the missile is deformed, and the modern bullet seems to have the property of flowing out of shape with uncommon ease, the effect on the head is the same as on the rest of the body, tremendous laceration and loss of tissue.

At ranges above 500 yards, the lessening in the energic activity of the bullet is rapid, so that at 1,800 yards, which is somewhat less than half the range of the German arm, only two slightly splintered wounds may be made in the skull. At such a range, if the skull and brain have merely been guttered, the patient has some chance for his life, and this seems to be especially true when a lateral shot has grooved the surface or tip of the frontal convolution, a part of the brain comparatively tolerant to physical insult.

The importance of these frontal wounds to the eye surgeon lies in the comparative frequency of the accompanying fracture of the orbital plate, a fracture which was long offered as a typical example of the "contrecoup," but which we now know to be part of the system of radial fissures produced by the splitting lateral, rotary action of the bullet on bone, or of the system of circular fissures, which are chiefly bending and bursting fissures, produced where the lines of transmitted energy or stress meet and oppose. Probably careful examination would also disclose quantitative or qualitative olfactory changes in these cases, as it is not easy to conceive of the weak cribriform plate of the ethmoid escaping uninjured. The results of such fractures of the orbital plate vary from slight to severe degrees of bleeding into the orbital fat, the upper lid and the conjunctiva, with more or less *protrusio bulbi*, to cases as grave as the following, which is offered as an addition to the causes of pulsating exophthalmos:

CASE 1.—F. W. was admitted, Oct. 28, 1914, with an oblique bullet wound of the right frontal region, which had ruined the right frontal boss, had opened the skull and the frontal sinus, had guttered the right frontal convolution and had produced three sagittal fissures in the right orbital vault, fissures radiating from the entrance wound. The margins of the wound were black from necrosis, and its depths were filled with pulsating, stinking fluid, and rotting cerebrum. The symptoms were severe headache and prostration and frequent vomiting. The lids of the right eye were pushed forward and everted by a markedly protruding and pulsating globe, which squeezed the conjunctiva forward in great, red chemotic folds. The sclera was deeply injected and the cornea was dulled by a beginning lagophthalmic ulcer. The anterior chamber, strangely enough, was of normal depth. The iris was discolored a dirty yellowish green, and the pupil was dilated and quite immobile. There was no red fundus reflex and the eye was amaurotic. The diagnosis lay between a pulsating exophthalmos, due to traumatic arteriovenous aneurysm from the laceration of the retrobulbar vessels by bone splinters, and a great orbital hematoma from the same cause. The wound was enlarged, cleansed of loose brain and bone fragments, and two long, loose anteroposterior fragments of the orbital plate were removed. Before this was completed,

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it had become evident that no extensive hematoma and no aneurysmal varix existed here. Instead, the lacerated frontal brain, with much accompanying serum and cerebral fluid, had poured through the widely spread breaches in the orbital plate, had driven the eye forward and had transmitted the cerebral impulse to the protruded ball. The final diagnosis was "pulsating exophthalmos from cerebral hernia into the orbit, after extensive fracture of the orbital plate." The patient died shortly after of a virulent dysentery of the Flexner type.

One of my surgeon-patients told me that at the front it was by no means uncommon to observe distinct pulsating exophthalmos as an antemortem sign among the frequent cases of side-to-side perforation of the lower temporal region.

Of course every known variety of eye injury occurring in civil life has its duplicate in battle injuries. In a number of such cases, some types of injury, however, are likely to stand out by reason of their frequency, and this has been the basis of my rough grouping of the cases which fell to my care or came under my observation.

1. The most frequent type of bullet wound as well as the most disfiguring wound of the orbital region, was that in which the antero-external wall of the orbit was cleanly shot away, the bulb always being ruptured. The exposure resulting was so nearly identical with that given by the Krönlein operation that I called these cases "Krönlein shots." In our series the right eye was injured in this way about twice as frequently as the left.

2. In many cases in which bullets struck or perforated the orbital cone, without touching the globe, the globe was shattered by indirect violence; or if this was not great enough to produce a rupture, lesser expressions of force appeared as iridodialyses, dislocations of the lens or rupture of any of the tunics of the eye, alone or in any combination. Reports of four different cases of this type follow:

CASE 2.—Lieut. F. was shot from the rear while leading a charge up a hillside during the first Serbian campaign. The bullet entered at about the middle of the scapular origin of the right trapezius, continued obliquely across the right neck to the lower jaw, comminuting part of its alveolar and all of its coronoid process, perforated the superior maxilla and malar bones and emerged from the external angular process of the right frontal bone. The orbit was not entered, yet the lower lid was torn away from the inner canthus, its conjunctiva lacerated horizontally in three places, and the cornea, iris and ciliary body were ruptured horizontally at about 190 degrees. Enucleation and a plastic operation on the lid were required. This case was of further interest in that the trismus, which followed the shattering of the coronoid process, simulated tetanus and rendered feeding so difficult that the question of ultimate starvation actually arose. This was overcome by gradual, forcible opening of the mouth and by the later removal of necrotic jaw-bone through the mouth.

CASE 3.—A private was shot in the right cheek while sighting his rifle. The bullet entered just below the center of the attachment of lower lid to orbit, perforated the superior maxilla, crossed the antrum, leaving several large fragments of bone in its wake, and finally emerged from the mouth through the palate, which it fissured freely in the coronal plane. The orbit was not entered. The right eyelids were edematous, the conjunctivae injected and considerable ciliary injection was present. The cornea was normal and the anterior chamber of normal depth but with a slight hyphemia. The iris was clearly marked, but was discolored to a greenish blue.

No fundus examination was possible on admission because of hemophthalmos, but this lifted in about two weeks, revealing a ragged tear squarely through the macula and curving downward and inward for about 6 mm. The retina in this situation showed the characteristic changes of a retinitis proliferans.

The vision at the time of discharge was 6/3 with the left eye and finger counting at 2 cm. with the right. In this case, as in practically all cases in which bullets open the accessory sinuses, empyema resulted, but healed in about twenty days after the fragments of bone were removed through the canine fossa, and free drainage established.

CASE 4.—The patient was struck squarely over the left frontomalar suture by a spent bullet from a machine gun. The missile had so little energy left that not only could it not penetrate the hard bone, but also it dropped back out of the wound. On admission, the iris was found to be torn radially down to its root at about axis 45, the lens was luxated downward and the black sickle of the ciliary body could be seen running from axis 20 nearly to axis 50. In this situation especially there was marked iridodonesis. The lens was gray-white and swollen forward into the pupil. Repeated Roentgen examinations detected no foreign body in eye or orbit, so the diagnosis of capsular rupture by indirect violence was made. Atropin was given, but the tension rose to the point where a linear extraction was made necessary.

CASE 5.—J. K., sergeant, aged 28, and a lawyer in private life, was shot in Russia, October 23, and admitted, October 29. The left lower orbital margin was shot away from left to right, producing a large coloboma of the lower lid. The ball passed through the inner canthus and the nose and emerged 1 cm. below the inner canthus of the right eye. Neither eye suffered direct violence from the missile or from bone fragments. The attachments of the internal and inferior muscles of the left eye were torn away, its sclera was ruptured in several places in the lower inner quadrant, the cornea was wrinkled and the bulb collapsed. The shallow anterior chamber held blood.

The principal changes in the right eye consisted in a considerable hemophthalmos and a 6-mm. long circular rupture of the sclera, lying midway between limbus and fornix in the upper inner quadrant. Through this rupture the vitreous had flowed, to lift up the conjunctival covering in the form of a transparent semiovoid, through which came the dark shimmer of the uvea. The iris was pulled so strongly outward and upward that less than its lower half was visible. By November 18, the right eye was partly freed of blood and could perceive light at 3 meters. Temporal projection was false, but nasal projection was accurate. The conjunctivitis of both eyes, which had resulted from the large openings into the nose, was cleared up by this time and permitted the enucleation of the left eye, with a suture of the upper lid to the margin of the great coloboma of the lower lid, for the best cosmetic result. At the same sitting, three deep mattress sutures of silk closed the scleral rupture.

One of the most interesting facts which these cases of indirect violence have shown, and a fact which is of the greatest importance in any consideration of the mechanism of the production of bullet wounds, is that the injury to the bulb is seldom, if ever, in a direct line with the line of incidence of the blow, but is usually nearly at right angles to this line. This must be accepted as the effect of the rotary, boring motion of the bullet, produced by the rifling of the barrel and which, as demonstrated here, in shots of the brain and by its action on bone and on soft organs like the liver, is by far the most pathologic motion of the bullet. That this rotation of about 2,500 times per second, at the rifle muzzle, could have gone so long unconsidered as the source of most of the lateral trauma along the bullet path, seems strange, in view of the radial splits and fissures which stream out at, or nearly at right angles to the course of every bullet, in soft viscera, as well as in bone.

3. Probably shrapnel and other shell explosions are the most common cause of unilateral blindness, and

lead most frequently to enucleation, from direct perforation of and lodgment in the bulb, with or without infection, or from the frequency with which malignant serpent ulcers follow the not uncommon corneal abrasion. Curiously enough, small shrapnel fragments seem to be less often the corneal abraders than the particles of dirt which spurt to all sides in clouds when the shell explodes on or just above the ground. The high explosives with which shells are charged may break them into two or three thousand fragments, of sizes which vary from the great, irregular masses of metal which have all the terrible lacerating effect of solid shot, to the finest, dustlike particles whose presence in structures like the eye is often demonstrable only after repeated roentgenograms.

The smaller shrapnel fragments produce all the types of perforating injuries seen in civil life, traumatic cataract, iris prolapse and hemophthalmos being perhaps most often observed. Panophthalmitis is not uncommon, as might have been anticipated from the high percentage of infection following shell and shrapnel injuries of other parts of the body. As I have reported in a previous article,[1] this percentage reached over 85 in our general series of shrapnel and other shell wounds.

Our common rule in these cases of perforating wounds produced by shell fragments was prompt enucleation where there had been material damage and when fragments of any size were lodged in the globe and were not easily accessible. Local anesthesia could not be employed here because of the unusual tenderness and the frequency of an accompanying low-grade orbital cellulitis and of unusual bulbar and conjunctival adhesions. No enucleation was deferred because of a mild orbital cellulitis, nor was any change made in the usual method of operating, yet in no case was there the least sign of meningeal extension of the orbital inflammation. When very small and dust-form fragments were the offenders, expectant measures were used if the vision was not diminishing and if the eye was not tender or had no noticeable amount of reaction. Of course, such patients were kept under close observation and, when discharged, were cautioned to report themselves at the slightest sign of intolerance to the foreign body. The results following the removal of shrapnel and other shell fragments were much more unsatisfactory than those following the removal of similar metallic fragments in civil life. This was probably due to the much greater length of time ensuing between injury and operation and to the greater frequency of infection.

4. Our cases of war psychoses, among which hysterical amaurosis is included, were all the result of a shell of some sort bursting unexpectedly in their neighborhood.

The following case is fairly typical:

Case 6.—L. R., aged 29, a sergeant-major and in private life a bookkeeper, stated that a shrapnel struck the ground in front of him and burst at the very moment of striking. For a moment he was unconscious and thereafter saw everything so clouded and so imperfectly that, in trying to obey orders, he led his men in the wrong direction and commanded them to fire in the direction of his own main body of troops. Seven days after the battle, the movements and external appearance of the eye were found to be normal. Both pupils reacted briskly and the fundi were normal. Vision was reduced to the perception of hand movements. With a +10 sphere the right eye could count fingers at 5 cm., and with a +8 sphere the left eye counted them at 3 cm. The fields of vision were shrunken to mere points. A nerve examination showed a right facial analgesia, but all other reflexes were normal. Treatment consisted of sweating and complete rest in bed for several weeks, together with the assurance of complete recovery. Later faradization and strychnin sulphate injections into the temporal regions aided in a very slow but constant improvement, which, in our belief, was retarded by the patient's unwillingness to face the prospect of a return to the front. Several of our patients who suffered from war psychoses declared that the air pressure produced by the explosion was the real causative factor in their conditions, as it had hurled them several meters high into the air, a seemingly obvious misstatement.

5. About a sixth of our eye cases were those in which the strain of hard campaigning on insufficient food, and with exposure to weather and to filth conditions, had produced the same ocular diseases or recrudescences which might be expected to follow similar strain or exposure in civil life. The most noticeable among these were recurrent cases of rheumatic iritis, keratitis eczematosa and parenchymatosa, chronic and acute conjunctivitis and serpent ulcer. One case of severe rheumatic iritis occurred in a Jewish private who had deserted and come to us after his regimental doctor had repeatedly refused him treatment on the ground that nothing was wrong with the eyes.

A rather frequent cause of corneal ulcer was from dirt thrown into the eyes in the strenuous digging of hurried intrenching or in the unexpected caving in of trench walls.

I am confident that one sequel of this war will be the extension of trachoma, which was being well limited in Austria and Germany, but which is now being freely introduced throughout both countries by the hordes of refugees from infected districts.

6. Another interesting group of cases was referred to us from all sides. These were cases in which the eye had been shattered at periods of from one to four weeks prior to admission. When the injury was not more than a week to ten days old, scleral and rarely corneal residues could be made out in the depths of the wound, but beyond that time the vigorous conjunctival growth almost invariably buried them beyond recognition, and an exploration was often necessary, when, as frequently happened, no history accompanied the patient.

In every case of this sort the residues were carefully removed as a prophylactic against later cystic or malignant growths, as well as for their possible influence on the sound eye. Without exception the conjunctiva was adherent in unusual situations, and the conjunctival sacs were so greatly shallowed that, even after free dissection of the unusual bands and adhesions, a good cosmetic result with regard to wearing artificial eyes was seldom obtained.

7. Several of the many irregular cases are worthy of record:

Case 7.—An infantry captain, who was wearing his pince nez into action, felt a sharp, stinging pain in his right eye, following the explosion of a shrapnel several meters in front of him. As his lenses were undamaged he supposed that flying dirt had hit his eye without injuring it. On testing the eye, however, he found that he could see nothing with it. Even then his regimental surgeon, who had made an external examination and had found no wound or obvious change, assured him that nothing was the matter, but his rank procured him attention, without the need of desertion, and he was referred to us about five days after the injury. No wound could be found in cornea, sclera or conjunctiva,

1. Mills, Lloyd: Wounds Received in Battle, The Journal A. M. A., April 10, 1915, p. 1224.

but blood was present in the vitreous and prevented ophthalmoscopic examination. The roentgenogram revealed two fine shrapnel splinters in the posterior upper and inner quadrant of the vitreous, and as vision did not improve during the two weeks following and the eye became somewhat sensitive to pressure, I was obliged to enucleate. The main interest of this case is in the manner of injury. The only possible path for the shrapnel fragments to have taken without breaking the glass before the patient's eye was between bridge and lens, entering the tissues just at the inner canthus, passing behind the transitional fold in this situation and entering the sclera at or just behind the equator.

CASE 8.—A private was shot in the right lower lid. The shot was supposed to have been merely a gutter shot of the lid, although the reason for a vision of 6/18 was unexplained. No limitation of motion was observed that could not be accounted for by local reaction to trauma. About three weeks after the injury the lower lid became inflamed, and on reopening of the wound an undeformed bullet was found lying snugly in the soft tissue beneath the bulb, slightly in front of the equator, its axis in the coronal plane. Vision returned to 6/6 almost immediately after the removal of the foreign body.

CASE 9.—A shell burst just behind a young color-sergeant, and his right occiput was perforated by some of the fragments. He was transferred to our service about two weeks after his injury because of an increasing ulcer of the left cornea. The roentgenograms showed three jagged metal fragments, about the size of beans, lodged in the nuclear region of the upper cranial nerves in and slightly to the left of the middle line of the body. The whole right side of the trunk was paralyzed, apparently from pressure on or destruction of the left pyramidal tract before its decussation. There was complete paralysis of all intrinsic and extrinsic muscles of the left eye, representing lesions of the nucleus of the third left cranial nerve, of the fourth right nucleus and of the nuclei of the sixth nerves. The right external rectus and the superior oblique were paralyzed, and the right pupil was dilated and reacted feebly and sluggishly to strong light. A deep and widely infiltrated ulcer of the left cornea had resulted from the ptosis and combined sensory paralysis. The left side of the face was wholly paralyzed, the origin being a lesion of the seventh nuclei. This lesion was probably the initial cause of the corneal ulcer, for the left corneal reflex was lost. In such a case the distinction between neuroparalytic ulcer and lagophthalmic ulcer is rather fine. No accurate hearing tests were made, but hearing was greatly reduced in both ears. That the ninth nuclei were also involved was shown by difficulty in swallowing, thick speech and constant drooling. No attempt was made to remove the shell fragments, although such an attempt offered the only frail hope of betterment. The left eye atrophied after iridocyclitis.

8. The last prominent group of cases owes this prominence directly to the use of the modern sharp-pointed, high-powered projectile. These are the sad cases of bilateral blindness, due to destruction of, or vital injury to both bulbs, to both optic nerves, to the retrobulbar vessels, or to any combination of these injuries. While fragments of shells of all kinds are responsible for many of these cases, the modern bullet is the chief instrument in the production of these most terrible of battle-wounds. Victims of the short-range wounds of the regions involved, as has been shown, happily, rarely survive; but the penetration of the modern bullet, at ranges above 1,500 yards, is still so great that it can destroy the visual apparatus of both eyes and yet often allow the victim to live miserably on. Because of its far smaller power of penetration, the older arm at long range far more often led to lodgment of its coarser missile in the bone or brain, before both visual tracts were destroyed. If what I have witnessed in Austria and Germany is any criterion, then the frequency of this terrible injury should, alone, lead to the abandonment of the spitzer bullet, or at least to its modification.

Every clinic is furnishing its heavy quota of these pitiful cases, nearly all of them young, strong men and nearly all so overwhelmed by their terrible misfortune that they would and often do accept any means of suicide when the fact of their blindness finally becomes an assurance to them. When these brave men soberly and earnestly pray for death, it is a pity that any power, whose inhumanity is so wholly responsible for their grief and suffering, will not either make these men and their families quite independent for life, or else give this longed-for boon of euthanasia in slight return for all that has been sacrificed to the names of patriotism and of country.

1669 West Adams Street.

## ABSTRACT OF DISCUSSION

DR. LLOYD MILLS, Los Angeles: In so far as I am aware, the production of a vacuum by a bullet has never been considered as a factor in the production of trauma. Until the experimental work of Victor Horsley on projectile wounds of the brain, the forward motion of the bullet was held to be its only pathologic one. When the eyeball is struck by the bullet, the principle of incompressibility of fluids comes into play and the globe is always completely shattered.

DR. JOHN A. DONOVAN, Butte, Mont.: In addition to the destructive action of the modern bullet, just explained, it has a suction or vacuum-creating action, which in my opinion explains one of its awful death dealing effects. On man this is hard to demonstrate, which accounts for its being so far overlooked, but on larger animals it is marked. I have repeatedly seen the stomach contents evacuated through a bullet exit hole out of all proportion to the size of the hole or any natural pressure effect; also long loops of intestine, apparently drawn through exit bullet holes. To my mind the suction evidence was most conclusive in shooting an elk. My bullet passed through the body, perforating intestines and stomach, broke a rib, was deflected, and broke the front shoulder. Between the ribs and skin, following its course, was fecal matter, completely filling a space about three-quarters inch in diameter, and over 10 inches long. My guide exclaimed in astonishment, "The elk has a gut going to its shoulder." This could occur only by a most powerful suction action, which is furthermore confirmed by the fact that a lung wound in a big animal with these bullets has almost no stopping effect. I refer to our own army 1906 sharp point 150 gr. bullet, turning once in 10 inches, and having a velocity of 2,700 feet per second. The enormous vacuum created can be more easily comprehended by stating that this initial velocity is practically 1,800 miles an hour.

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**Heart Block.**—The prognosis and treatment in heart block depends largely on etiology. Where the block is due to overstimulation of the vagus nerve, such as is seen in digitalis poisoning, stopping the digitalis and paralyzing the vagus with atropin will usually bring about a return to normal. Where the block is complete, heretofore it was thought always to be due to some organic division of the conducting path. We now know that in some of these cases there is not a complete, permanent division of the bundle, but complete block may be due to more temporary causes, such as poisoning from infectious diseases or asphyxia. In this class of cases complete recovery sometimes occurs. Even in the cases of organic origin, after the symptoms of syncope have persisted for some time, a degree of toleration becomes established and circulation is carried on with the slow ventricular rate. Such patients, however, are never able to undertake any but the most restricted activities.—W. H. Lowman.

# CHOLECYSTECTOMY AND CHOLECYSTIC TOXEMIA *

W. WAYNE BABCOCK, M.D.
Surgeon to the Samaritan Hospital
PHILADELPHIA

According to the mode of invasion, gallbladder infections may be divided into four types:

1. Portal infection, in which bacteria entering the portal circulation, chiefly from the alimentary tract, escape the bactericidal action of the liver and passing out with the bile, colonize in the gallbladder. This method, described years ago by Adami, has been considered as quite common and is supposed to explain the relationship between appendicitis, intestinal ulceration and other inflammations of the alimentary tract and gallbladder disease.

2. Ascending biliary infection, in which bacteria ascend from the ampulla of Vater through the common and cystic ducts and enter the gallbladder. This process is aided by the reversed mucous currents described by Bond, who showed that carmine particles introduced even as low as the rectum would after a time pass upward against the normal peristaltic current, and be discharged on the surface of the skin through a cholecystostomy opening. Although probably less frequent than other methods, ascending biliary infection occurs in certain inflammations and new growths involving the duodenum.

3. Hematogenous infection, in which bacteria circulating in the general blood stream invade the gallbladder. Rosenow has shown the specific manner in which certain streptococci circulating in the blood, attack the gallbladder or produce gastric ulcer, and his experiments suggest that many causes of cholecystitis formerly considered of a portal or ascending biliary type are in reality focal hematogenous infections. The well-recognized metapneumonic cholecystitis of young children apparently occurs in this way, as does the infection of the gallbladder in typhoid fever.

4. Contiguity infection, in which the gallbladder is involved by the spread of infection from adjacent organs, as when an adjacent abscess perforates, or malignant or benign ulcer of the stomach or duodenum invades the gallbladder. This is a relatively rare form of cholecystic infection.

Frequence: Infections of the gallbladder are exceedingly common. Next to appendicitis, cholecystitis is the most frequent of all the chronic intra-abdominal infections. In some classes of people, notably obese, middle-aged multiparas, it is more frequent than appendicitis. It is the second great cause of chronic indigestion. Inflammation of the gallbladder often develops during the first and second decades, but as the local symptoms are unobtrusive, the condition usually escapes recognition. After middle age, as the local symptoms become more predominant, the diagnosis of gallbladder disease is made. Thus we have been accustomed to consider it a disease of middle or advanced life.

Persistence: Infections of the gallbladder are exceedingly chronic. It has long been known that typhoid bacilli may continue to multiply for thirty or forty years in the gallbladder. It is now recognized that other bacteria likewise may have persistent growth. The bacteria are found in the center of the gallstone, in the bile, and in the mucosa lining the gallbladder wall. Bacteria found in the center of gallstones and within the depths of the mucosa usually represent more or less remote infections and may be associated with bile that is practically sterile. At present, although most of the patients operated on for gallbladder disease have reached the fourth or fifth decade of life, a careful study of the history usually indicates that these same patients acquired their infection in the second or third decade. As yet we have not learned to sterilize the chronically infected gallbladder and the patient once infected may be continuously infected until the gallbladder is removed, or until a violent necrotic form of inflammation destroys the lining of the mucosa and leaves the gallbladder a shrunken, functionless mass of fibroconnective tissue. The temporary relief that follows medical treatment, or a Carlsbad course, prompts the patient and physician to defer operation until advanced pathologic changes have occurred. After a simple drainage operation, the bile clears and the patient is relieved, but the deep infection in the gallbladder wall persists and the symptoms of chronic cholecystitis may later recur. If the symptoms are not of the obstructive type, the patient will usually tolerate them, although not infrequently more radical treatment is demanded.

Symptoms of cholecystitis: Apart from a small area near the neck the gallbladder has no sensory nerves, and distention or inflammation produces no symptoms unless the irritation spreads to adjacent sensitive structures. In operating under local anesthesia, we have repeatedly incised, sutured and crushed the wall of the inflamed gallbladder without pain. Only when traction or pressure affects the ducts, other sensitive organs, or especially the parietal peritoneum, does the patient complain. One should not, therefore, expect local symptoms in inflammations that are limited to the gallbladder proper.

Symptomatically, we would divide chronic cholecystitis into three stages:

First, a stage marked by more or less remote reflex and toxic symptoms and by the absence of local symptoms. This is the stage of cholecystic indigestion and toxemia and represents a period in which the gallbladder factor is usually unrecognized. It usually continues from fifteen to twenty years before the development of the second stage. In this first stage the mortality under operative treatment should be under 1 per cent.

Second, a stage characterized by the movement of calculi, or by recurrent attacks of acute inflammation. Stones cause paroxysms of pain usually by obstructing the outlet of the gallbladder. The attacks are violent, often follow indiscretions in diet, usually require an opiate, frequently occur at night and last but a few hours. To be differentiated are the acute recurrent attacks of cholecystitis in which no calculi are present. The latter are less violent, usually do not require an opiate, last several days instead of a few hours, and have an onset and termination less abrupt than the colic produced by stone. On exposure, these gallbladders are often considered to be normal, the operator, finding no stones or marked evidences of inflammation, concludes he has made an error in diagnosis. The second stage, or stage of acute biliary

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paroxysms, is chiefly observed between the ages of 35 and 55 years. The mortality from operative treatment in this stage is from 3 to 5 per cent.

Third, a final stage characterized by acute and dangerous complications, such as empyema, or gangrene of the gallbladder, obstruction of the common bile duct, acute pancreatitis, rupture or perforation of the gallbladder, malignant disease, acute peritonitis, or intestinal obstruction from stone. These complications marking the third stage of cholecystitis are most frequently observed between the ages of 45 and 75. One of our patients was 80 years of age, seven were over 70. Unfortunately, a large proportion of patients reach the third and dangerous stage of cholecystic infection before coming to operation. That one fourth of all the operated patients of a well-known surgeon should have had associated disease of the pancreas is a sad commentary on medical delay. The occurrence of the third stage of cholecystitis is a reproach to our medical art, and indicates an average procrastination in the effective treatment of cholecystitis of about twenty years. Rather unusually, of course, we meet with exceptions. Thus during the past year I have seen one girl of 14 years with over three hundred gallstones, acute pancreatitis and fat necrosis; and a boy of 15 years with twenty-eight gallstones, localized peritonitis and a gangrenous gallbladder 7½ inches long. The mortality in this stage of cholecystitis probably averages over 20 per cent. The relief from many reflex and secondary symptoms of early biliary infection, the prophylaxis of gallstones and of the dangerous complications of cholecystitis lie in the effective treatment of the first stage of cholecystitis, and therefore the recognition of this stage deserves special consideration.

The evidence of cholecystitis of the first stage is not found in a physical examination of the upper right quadrant of the abdomen, but is to be determined by deductive reasoning. The history of the patient usually reveals a cause of infection which has a relationship to the development of certain reflex toxic, or secondary infectious processes that experience has shown frequently to express cholecystitis. These may be grouped as follows:

(*a*) Digestive: Most common are the reflex digestive symptoms. Fulness and distress after eating, with sour bitter eructations, belching, and more rarely vomiting are usual. There may be a constant foul taste in the mouth, which at once disappears when the gallbladder is drained or removed. The dyspepsia is of the "qualitative" type, rather than the "quantitative" dyspepsia of ulcer; that is, attacks of indigestion often follow certain articles of diet, such as shellfish, cheese, boiled dinners, fried foods, pastries, corn, and the like, and may not be influenced by the amount of food eaten. The patient will often mention an idiosyncrasy toward certain foods. The inability of a patient to handle certain staple articles of diet should suggest biliary disease. It is perhaps the most common condition that causes a patient to report periodically to a physician for relief from attacks of so-called biliousness or indigestion. The attacks are usually relieved temporarily by fasting, dieting, by alkalies, or by a saline or calomel course.

As to the differential diagnosis, transient, often nocturnal, attacks of indigestion in an obese, middle-aged woman precipitated by a dietetic indiscretion and requiring a hypodermic injection for relief, are rarely due to other causes than gallstones. With the history of such preceding attacks, a very violent and persistent attack suggests empyema, or gangrene of the gallbladder; while an attack of superlative severity with shock and epigastric distention and tenderness usually means a pancreatitis. As contrasted with gastric or duodenal ulcer an attack of gallstones lasts a few hours, is most abrupt and severe; an acute cholecystitis a few days and is less severe; while an ulcer attack usually lasts for several weeks and is the least severe. Between the paroxysms from stone or acute cholecystitis, which may be months or weeks apart, the patient usually has a greater degree of dyspepsia than is found between the exacerbations of ulcer. In ulcer, feeding may give temporary relief, "food ease"; while distress accompanies an empty stomach "hunger-pain." In cholecystitis and stone, food exacerbates and vomiting relieves the pain.

(*b*) Intestinal symptoms: The intestinal symptoms of cholecystitis are as yet not fully understood. The continuous discharge of bacteria laden bile into the intestinal tract may give rise to the so-called intestinal indigestion, and in some instances to the symptom of intestinal toxemia, so graphically described by Mr. Lane. It is possible that some of these patients have been given a measure of relief by the removal or elimination of the colon, not because the cause was removed, but because the absorptive surface of the intestine was reduced. There is an association between cholecystitis and appendicitis, the appendix either infecting the portal system and gallbladder, or being coincidentally infected by a common cause. Wohl has reported that in 50 per cent. of our cases in which the removed appendix was also studied, there was evidence of appendicitis.

(*c*) Peritoneal symptoms: Peritoneal symptoms result from acute inflammation or secondary adhesions. The forms of localized or diffused peritonitis that may result from the later stages of gallbladder infection require little special discussion. Attention should be directed, however, to the frequent error in mistaking cholecystitis for appendicitis. An enlarged inflamed gallbladder, with only a small area of the fundus projecting below a Reidel lobe of the liver, frequently produces recognizable peritoneal inflammation only when the exposed fundus comes in contact with the sensitive parietal peritoneum, and this frequently is directly under McBurney's point. In nearly every such instance which we have seen, the examiner, overlooking the less distinct and less sensitive area of resistance which spreads down from the right costal border, has concluded that acute appendicitis was present.

(*d*) Arthritic and muscular complications: Subacute or acute metastatic joint infections are frequently observed in chronic cholecystitis. Often these symptoms improve after cholecystectomy. Chronic joint changes of the type of arthritis deformans are also observed. Myalgic pains are exceedingly common.

(*e*) Cardiovascular symptoms: Few patients pass to the third stage of cholecystitis without some evidence of cardiovascular disease. Endocardial and particularly myocardial changes seriously increase the risk of anesthesia and of operation in long-standing gallbladder disease. To some degree pathologic changes of the arterial wall also have their origin in cholecystic infections. Cardiovascular symptoms may greatly improve after operations on the gallbladder.

(*f*) Respiratory symptoms: We have been impressed by the surprising relief from paroxysmal cough and asthma that may follow cholecystectomy, or cholecystostomy, and we have operated for these symptoms alone. Two of our patients who had been unable to sleep except in a sitting posture for five and seven years, respectively, found they could recline with comfort after the operation, and the asthma and cough disappeared. After a period of relief for some weeks, however, the symptoms recurred. It would seem that cholecystic toxemia is a factor in some of these cases.

(*g*) Cerebrospinal symptoms: In cephalalgia, neuritis and some of the neuroses relief may be obtained by operating on the gallbladder. In the so-called bilious sick headaches we have observed relief after cholecystectomy, and in one violent case we operated for this symptom alone, with relief. In this case the symptom was a sequence to typhoid fever. In certain of the prematurely worn women of middle age, who constantly complain of indigestion, bloating, constipation and a multitude of aches, pains and surface paresthesias, there has been something of a mental transformation after the removal of a chronically infected gallbladder.

(*h*) Fever: Fever without other symptoms may result from cholecystic infection. The bile may be free from pus, the gallbladder bluish and nearly normal in appearance. The fever disappears with the removal of the gallbladder. One of our patients with no local symptoms had been treated in hospitals for months for an apparently causeless continuous fever, that immediately subsided after the excision of what seemed like a normal gallbladder.

(*i*) Eye symptoms: Eye symptoms are not infrequent with biliary disease. At times we find the oculist promising relief from the digestive symptoms of cholecystitis by the application of glasses, or, again, vainly attempting to control a vacillating series of refractive or muscular abnormalities.

### DIAGNOSIS

The diagnosis of cholecystitis after opening the abdomen is not always easy. We depend on one or more of the following abnormal conditions:

1. Alteration in the color, size or consistence of the walls of the gallbladder. A milky or whitish gallbladder is diseased, but many translucent, bluish gallbladders are also diseased.

2. Adhesions or other evidence of pericholecystitis. Often the liver adjacent to the gallbladder shows evidence of chronic perihepatitis by whitish plaques or connective tissue trabeculation.

3. Enlargement of tributary lymph nodes: Attention has been especially directed by W. J. Mayo to the lymph nodes. The palpating finger is introduced into the foramen of Winslow and the nodes near the junction of the cystic and common ducts examined. While such lymph-node enlargements usually indicate cholecystic infection, they may also occur from pancreatic or duodenal disease. Absence of enlargement unfortunately does not negative cholecystitis. At times we have observed the absence of adenopathy in purulent or gangrenous as well as in catarrhal cholecystitis.

4. Alterations in the bile contained within the gallbladder: Normal bile is of a clear golden yellow color; turbid, purulent, dark green, tarry bile, or bile containing crystals, sand or calculi, indicate cholecystitis. Colorless mucus indicates cystic-duct obstruction and a mucocele. For diagnostic aspiration, to avoid leakage, should the gallbladder not be removed, a fine needle should be introduced into the gallbladder through a thin layer of overlying liver substance.

5. Alterations in the mucosa: Papillary denudations producing the finely speckled or strawberry gallbladder, papillary outgrowths, infiltrations of the mucosa as well as the grayish, greenish or blackish wall, or sloughs seen in empyema or gangrene, indicate varying grades of gallbladder disease.

### PROGNOSIS

Cholecystitis may be alleviated by dieting, alkalies, salicylates, vaccines or a saline or Carlsbad course. It is more surely curable by the operative removal or obliteration of the mucous lining of the gallbladder. Most patients who finally come to operation have had some degree of relief from dieting, or various medical measures. In a woman who, for six years, following typhoid fever, had suffered from indigestion, headaches, myalgia, bromidrosis and foul taste, the symptoms almost completely disappeared after a course of typhoid vaccines. Except in the third stage of cholecystitis which brings an immediate danger to life, operation is usually delayed or considered unnecessary. At present, surgery, which is about the only permanently effective therapeutic measure against cholecystitis, is about twenty or thirty years behind the pathology of the disease, usually ignoring the early stages of inflammation and cholecystic toxemia, permitting years of morbidity and crippling tissue changes to supervene, and only intervening when a violent local reaction drives the patient to the surgeon.

### OPERATIVE TREATMENT

Anesthesia: An anesthetic may increase the danger of operation on the biliary tract by depressing the cardiac and respiratory systems, adding to the preexistent toxemia, inhibiting elimination, and by producing straining movement, violent respiratory action and rigidity of abdominal muscles, that so embarrass the surgeon as to invite dangerous technical errors. At the Samaritan Hospital during the past three years, one patient with a perforated gallbladder and an upper abdominal peritonitis, was asphyxiated by profuse, regurgitant vomiting, while under spinal and narcotic anesthesia. In a second patient with myocarditis, cholecystitis and acute peritonitis there was a fatal respiratory cardiac failure. A third similar fatality occurred under the administration of ether. We have been able to reduce the mortality by substituting local anesthesia for patients who are bad risks. The local anesthetic solution is used very freely, 1 per cent. of novocain being employed for the skin and subcutaneous tissues, and a 0.25 or 0.5 per cent. solution being employed for the muscular, fascial and peritoneal layers. A free injection of such weak anesthetic solutions seems not only harmless but often beneficial, acting like a hypodermoclysis in assisting elimination. If the patient's general condition permits, a moderate supplemental narcosis produced by morphin-scopolamin is used. Especially in the very old, the very toxic or asthenic with empyema or gangrene of the gallbladder, or perforation and peritonitis, do we prefer local anesthesia. For patients in better physical condition, we prefer spinal anesthesia because it does not interfere with elimination or increase preexisting toxemia, and

at the same time gives far better relaxation than ether does. It is dangerous for operations on the gallbladder in obese elderly patients who are toxic and have serious myocardial change. Rectal anesthesia, from its especially intense action on the liver, should be avoided.

Incision: A simple transverse incision made along a line slightly below the level of the ninth rib is valuable when operating under local anesthesia, especially if the gallbladder is large and there is marked muscular rigidity. In such a case the gallbladder and liver margin may be made to protrude from the opening and retraction and the introduction of pads within the abdomen are unnecessary. It is especially adapted for cholecystostomy, although occasionally a cholecystectomy may very conveniently be done. For the former operation a shorter incision may be employed, the different layers being divided along the same line. To give a better exposure of the ducts, a triangular flap incision, as suggested by Perthes, may be used. A right transrectus incision is made from the ensiform directly downward for 3 or 4 inches, from the lower end of this vertical incision a transverse incision is made to the right to a point just below the right costal margin. The vertical part of the incision is carried through the rectus to the posterior sheath and guided by the finger introduced behind the rectus fibers; two or three sutures of catgut are placed above and below the line of the transverse incision in such a manner as to fix the rectus muscle to the overlying aponeurosis, so that the divided muscle will not retract. The muscular and aponeurotic layers are now divided along the line of the transverse incision and the triangular flap thus formed turned upward and outward over the chest wall. The peritoneum and preperitoneal fascia are now divided along a line parallel with the costal border and about one-half inch distant from it. To avoid the objectionable right-angle incision of the skin, I have modified Perthes operation by substituting a simple oblique skin incision which is made parallel with the costal border after the plan of Kocher.

Alexander Don, to obtain a greater exposure and to avoid injury to the intercostal nerves, extends the vertical portion of the incision down to the level of the navel, and curves the transverse portion of the incision upward and outward toward the right axilla. The rectus muscle is completely freed and divided below and the posterior sheath of the rectus and peritoneum divided along the same lines as is the skin.

In patients with relaxed or thin abdominal walls a simple vertical transrectus incision often serves very well.

Cholecystectomy: In the first stage of cholecystitis, cholecystectomy is the preferred operation. It is the most effective method of treating the protean manifestations of the disease. The patients are usually under middle age, are not very obese and come to the operating table in good physical condition. With a perfect technic the operation in this stage should be a safe and satisfactory one, but unfortunately there are serious technical dangers always present in doing a cholecystectomy; an unfortunate snip of the scissors, a careless needle puncture or an imperfect ligation, is all that is required to place the patient's life in jeopardy, and these accidents have caused many surgeons to resort to ostomy when an ectomy would be the better operation. Even so skilful an operator as Moynihan reports three cases in which an hepatic or common duct was wounded. In my first ectomy, a case in which there were extensive intra-abdominal adhesions, the divided cysticus was imperfectly occluded and a secondary fatal leakage of bile into the peritoneal cavity occurred. In a recent case the gallbladder was distorted and displaced by adhesions, and on closing the peritoneal edges over the gallbladder bed, biliary leakage, evidently from a punctured displaced hepatic duct, occurred. The stitches were removed and drainage was instituted, with recovery. We have had three other cases of accidental duct injury or imperfect ligation of the cystic duct during cholecystectomy. These accidents are less frequent when the operation is performed in the first stage of cholecystitis. Since the first case we have now had 114 ectomies during the first stage of cholecystitis without operative mortality. In this stage the gallbladder is usually best removed from within outward, after the method so well illustrated by the Mayos. The cystic duct should be doubly ligated, mass ligatures should be avoided, as should anything which may serve to distort or obstruct the ducts. The cystic artery should be individually tied. Wide flaps of peritoneum should be separated from the gallbladder to cover the denuded area left under the liver. If there is any question as to absolute hemostasis or duct occlusion adequate drainage should be employed, so arranged or anchored by fine catgut that it cannot be displaced. In most of our ectomies we have been able to avoid all drainage. In cases of the second or third stage when the gallbladder is distorted or imbedded in adhesions, it may be safer to remove the gallbladder from without inward. In this way, by hugging the gallbladder very closely, there is less danger of damaging the hepatic or common duct. In case the adhesions are very marked, the method of Kehr of first splitting down the interior surface of the gallbladder at least into the cystic duct, is an advantage in determining the relationships of the parts.

Cholecystostomy: External biliary drainage, considered by the late Dr. Maurice Richardson only ten years ago, the one established therapeutic fact in biliary surgery, has a progressively lessening sphere of usefulness. Its use should be largely restricted to the third stage of cholecystitis for cases of empyema, perforation, gangrene, pancreatitis, advanced peritonitis or duct involvement, associated with such grave systemic changes due to age, toxemia or exhaustion, that only the simplest of operative procedures are warranted. It also should be used when technical limitations indicate that an ectomy will be dangerous. Under certain favorable conditions by performing cholecystectomy, we have been able to avoid drainage even in cases of empyema, gangrene of the gallbladder and acute pancreatitis. As a rule, the virulence of the bacteria found in empyema or gangrene against the skin and subcutaneous tissues is less than that of the bacteria found in purulent forms of appendicitis.

As cholecystectomy is the great measure of prophylaxis, it should be performed more frequently and much earlier and should have a progressively lower mortality than cholecystostomy.

If reasonably safe and feasible the appendix should also be removed in operating for cholecystitis. Despite certain results of animal experimentation, clinical evidence indicates that a patient is better off without than with a chronically infected gallbladder.

### MORTALITY

The mortality of cholecystectomy is due to: 1. Poor judgment in selecting patients with acute febrile and septic conditions, or patients greatly debilitated by age, chronic toxemia or complete and continued external drainage of bile. This latter class who have what we may term "cachexia-choleoprivia" bear operation very badly, readily falling into a condition of fatal shock irrespective of the operation or anesthetic employed. For them a simple Witzel enterostomy should first be done under local anesthesia and the bile shunted from the fistula into the bowel by a small rubber tube. The final operation should be delayed until the cachexia, due to the loss of bile, has been overcome.

2. Technical errors: Leakage of bile into the peritoneal cavity may result from the cystic duct having been imperfectly tied, or the common or hepatic duct torn, incised or punctured. In the case of bile leakage, if the general peritoneal cavity is not sufficiently protected by drainage and tamponade, a dangerous or fatal peritonitis may result. I have been impressed by the danger of (*a*) doing cholecystectomy in a private house where adequate light and sufficient exposure cannot be obtained; (*b*) separating the overhanging neck of the gallbladder without observing great care in hugging the gallbladder proper to avoid the adjacent communis; (*c*) puncturing the hepatic duct. The gallbladder may lie obliquely so that the hepatic duct is in the peritoneal fold to the side of the neck of the gallbladder, where it may be damaged in suturing over the gallbladder bed; (*d*) relying on insufficient tamponade for drainage in the presence of a biliary leak. In all cases, as an indicator, we place the end of a gauze sponge against the stump of the cystic duct, which is not removed until the end of the operation. Should this show staining by bile, we immediately reopen and control or isolate the area.

In a personal experience of 270 operations on the gallbladder and ducts, fifty-seven ectomies were done before 1912 with ten deaths, a mortality slightly over 17 per cent. In thirty-eight ostomies before 1912, there were three deaths, a mortality of 7.8 per cent. In 121 ectomies performed since 1912, there were two deaths, a mortality of 1.6 per cent. In forty-two ostomies since 1912 there were four deaths, or about 9 per cent. mortality. Before 1912, gangrenous and suppurating gallbladders were usually removed; now they are usually drained under local anesthesia. As having even a greater influence on the mortality is the stage in which the operation is done. In 114 cases of ectomy in the first stage of cholecystitis, irrespective of date or technic, the mortality was 0.88 per cent. In 101 operations in the second stage, sixty-seven being ostomies, there were four deaths, a mortality of 3.9 per cent.; while after fifty-four operations in the third stage of cholecystitis, there were eighteen deaths in which the operation or biliary condition was a factor, a mortality of about 32 per cent. Thirty of these patients had acute gangrenous or suppurative cholecystitis, seven an acute pancreatitis with fat necrosis. Twelve had primary or secondary operations for duct obstruction, fistula or duct or intestinal anastomosis. In only one patient was carcinoma observed, and this involved the ducts. In two cases, intestinal obstruction from gallstone existed. In another case an intestinal perforation had been produced. One death was from diabetic coma and one from pulmonary embolism. It is evident that the stage of the disease is more important than the type of operation in determining the mortality.

### SUMMARY

We consider inflammations of the gallbladder as bacterial infections of childhood or early adult life, as progressing for years, during which time secondary metastatic, toxic or reflex symptoms only are observed; as later having a second stage in which there are attacks of colic due usually to the presence of gallstone; as having usually after twenty or thirty years a third stage of serious complications, such as duct obstruction, pancreatitis, perforation, abscess or gangrene. We consider surgery as working, for the most part, far behind the pathology of the disease, and believe there is wide need for earlier intervention, so that the patient who starts at the age 12 or 15 with cholecystitis and dyspepsia may not at 35 have gallstone colic, and may not at 65 succumb to cholecystic gangrene or pancreatitis. We consider external biliary drainage as a rule undesirable, except in the late or complicated cases, an early cholecystectomy the operation of choice. Unfortunately, technical dangers make uniform success after cholecystectomy uncertain in the hands of the average surgeon. Despite this, the mortality of cholecystectomy in the first stages of cholecystitis is much less than cholecystostomy in the last stages of this disease, so that the results of a surgeon may depend more on *when* he operates than *how* he operates. The morbidity depends on *how* he operates.

2033 Walnut Street.

### ABSTRACT OF DISCUSSION

Dr. Robert C. Coffey, Portland, Ore.: In dealing with third stage, acute stage cases, in which there is an infected gallbladder, I wish to emphasize conservatism. It is often the case that these gallbladders may be enucleated by a simple incision of the peritoneum and peeled out practically without bleeding at all. There are some cases, however, in which this is not advisable. I refer to acute and violent septic cases. The point I wish to emphasize particularly is that this area must be quarantined properly. Expose the field thoroughly and place a large pack of gauze wicks laid straight down around the gallbladder, and around these wicks several layers of rubber tissue. Open the gallbladder, sponge out the fluid and insert a piece of gauze into the gallbladder. That is all that is necessary. It will take approximately five minutes. Many are gangrenous without widespread infection and it is quite safe, in these, to enucleate the gallbladder, which I say is easily done without hemorrhage at all. The gauze wicks of the pack are removed after six days and the rubber tissue in two weeks. In some instances it will be necessary to remove the gallbladder at a later operation.

Dr. W. Wayne Babcock, Philadelphia: In the young no drain may be required after ectomy. There is less danger of skin infection from removal of the gangrenous or suppurating gallbladder than from removal of a badly infected appendix, and therefore as far as wound infection goes, less need for wound drainage. When the patient is in good general condition, we may, therefore, in selected cases remove the badly infected gallbladder, close without drainage, obtain primary union, and a remarkably quick recovery. One patient went home a week after the removal of a gangrenous gallbladder. But as a rule, and especially if the patient has reached middle age and the gallbladder is gangrenous, ectomy is dangerous. In these cases we use local anesthesia, make a simple transverse slit, put in a drain, and sometimes even operate without removing the patient from the bed. The sloughs of the gangrenous gallbladder will be expelled with relative safety, while the removal of the gallbladder, by opening many lymph spaces, may be followed by rapid sepsis and overwhelming toxemia.

# THE REFRACTOMETRIC DETERMINATION OF ALBUMIN, GLOBULIN, AND NONPROTEIN

## IN NORMAL HUMAN BLOOD SERUM *

CHARLES L. TRANTER, B.S., M.D.
SAN FRANCISCO
AND
ALBERT H. ROWE, M.S., M.D.
CAMBRIDGE, MASS.

The microrefractometric method recently described by T. Brailsford Robertson[1] has enabled us to determine the amount of albumin and globulin in normal human serum. The specimens of serum which we have employed for this purpose have been obtained from students, nurses and doctors working in the hospital, who are in good health. No serums of patients have been used to establish these normal valuations.

In brief, the method is as follows: Blood is drawn into centrifuge tubes, allowed to clot, and centrifugalized. A portion of the clear serum is treated with an equal volume of saturated ammonium sulphate to precipitate the globulins, and the precipitate removed by centrifugalizing. The clear fluid is diluted to one-half and read in the refractometer. This reading, corrected for ammonium sulphate, gives the total albumin plus the nonproteins. The nonprotein value is determined from the clear fluid remaining after the proteins have been removed from another portion of the serum by heat and acetic acid. The total globulins are obtained by subtracting the refractometric reading of the albumins from that of the whole serum, after deducting the value of the nonproteins.

Emil Reiss has carried out extensive refractometric determinations of the total proteins of serum in normal as well as in pathologic cases. A monograph[2] containing a full account of his entire work and references to a great number of articles by other writers appeared about two years ago, and recently he has published a brief review[3] of this work, including that of the last two years.

Reiss obtains only the value of the total proteins in his work. In estimating this single value, moreover, Reiss considers the nonproteins constant enough, even in pathologic cases such as nephritis and diabetes, to give them a set value having a refractive index of 0.00277. Robertson has always considered this value too high, and has assumed that a more accurate constant value is obtained from the reading of sixth-molecular sodium chlorid, thus placing it around 0.00157.

At the beginning of our work, we saw the necessity of the individual estimation of the nonproteins in each pathologic case to assure accuracy. We have, therefore, determined the nonproteins or normal serums, giving us an average value of 0.00175. This is considerably lower than the value of Reiss, and lies nearer that assumed originally by Robertson. If it is desired to express the concentration of the nonproteins in percentages, this may be done with sufficient accuracy by dividing their observed refractivity by the constant factor of 0.00160. Many observers in cases of nephritis have shown increased percentages of nonproteins as compared with the normal. Thus, even in normal cases, about 0.6 per cent. error occurs when the constant value of Reiss for nonproteins is used, and it is evident that when the pathologic cases are dealt with, the error would be considerably greater. It is true that the method of Reiss is much simpler than that of Robertson, and that his error is not excessive. Yet the data obtained by the latter method gives not only an accurate determination of the total proteins as well as of the nonprotein elements, but also the amounts of albumin and globulin which go to make up the total proteins.

In normal individuals we have found that:

1. The total proteins range between 6.7 and 8.7 per cent., which corresponds to the figures of Reiss, which,

RESULTS IN NORMAL CASES

| Name | Sex * | Age | Weight in Pounds | Total Protein | Total Albumin | Total Globulin | Nonprotein | Albumin per cent. | Globulin per cent. | Nonprotein per cent. |
|---|---|---|---|---|---|---|---|---|---|---|
| A. R. | ♂ | 25 | 208 | 8.59 | 7.28 | 1.31 | .00174 | 85 | 15 | 1.09 |
| A. R. | ♂ | 25 | 208 | 8.51 | 6.96 | 1.55 | .00182 | 81 | 19 | 1.14 |
| A. R. † | ♂ | 25 | 208 | 8.45 | 7.79 | .66 | .00182 | 92 | 8 | 1.14 |
| H. K. | ♂ | 17 | 170 | 7.33 | 5.79 | 1.54 | .00158 | 79 | 21 | .98 |
| H. K. | ♂ | 17 | 170 | 7.90 | 5.86 | 2.04 | .00172 | 74 | 26 | 1.075 |
| A. S. | ♂ | 46 | 180 | 7.23 | 5.71 | 1.52 | .00172 | 79 | 21 | 1.075 |
| A. S. | ♂ | 46 | 180 | 6.70 | 5.21 | 1.49 | .00190 | 78 | 22 | 1.19 |
| F. K. | ♂ | 32 | 155 | 8.17 | 6.21 | 1.96 | .00172 | 76 | 24 | 1.075 |
| W. | ♂ | 19 | 160 | 7.77 | 6.32 | 1.45 | .00172 | 81 | 19 | 1.075 |
| D. | ♂ | 20 | 143 | 7.98 | 6.71 | 1.27 | .00172 | 84 | 16 | 1.075 |
| Cal. | ♂ | 22 | 150 | 8.16 | 7. | 1.16 | .00188 | 86 | 14 | 1.17 |
| H. W. | ♂ | 25 | 160 | 8. | 6.50 | 1.50 | .00172 | 81 | 19 | 1.075 |
| A. K. | ♂ | 30 | 165 | 8.02 | 6.89 | 1.13 | .00172 | 86 | 14 | 1.075 |
| F. B. | ♂ | 27 | 150 | 8.08 | 6.32 | 1.76 | .00172 | 78 | 22 | 1.075 |
| Hes. | ♂ | 31 | 140 | 7.81 | 6.30 | 1.51 | .00172 | 81 | 19 | 1.075 |
| S. | ♂ | 24 | 160 | 8.24 | 6.71 | 1.53 | .00172 | 81 | 19 | 1.075 |
| G. I. | ♂ | 38 | 175 | 7.85 | 5.31 | 2.54 | .00172 | 68 | 32 | 1.075 |
| T. D. | ♂ | 20 | 165 | 7.53 | 5.94 | 1.59 | .00172 | 79 | 21 | 1.075 |
| Lin. | ♂ | 24 | 150 | 7.78 | 6.44 | 1.34 | .00188 | 83 | 17 | 1.175 |
| Ow. | ♂ | 24 | 165 | 8.35 | 6.23 | 2.12 | .00188 | 75 | 25 | 1.17 |
| Go. | ♂ | 25 | 185 | 8.09 | 6.82 | 1.27 | .00188 | 84 | 16 | 1.17 |
| Wil. | ♂ | 22 | 155 | 8.27 | 6.71 | 1.56 | .00172 | 81 | 19 | 1.075 |
| Fal. | ♂ | 31 | 194 | 8.70 | 7.70 | 1. | .00172 | 89 | 11 | 1.075 |
| Fl. | ♂ | 24 | 170 | 8. | 6.12 | 1.88 | .00172 | 77 | 23 | 1.075 |
| Lib. § | ♂ | 29 | 140 | 7.43 | 4.95 | 2.48 | .00172 | 67 | 33 | 1.075 |
| L. | ♂ | 35 | 153 | 7.74 | 5.64 | 2.10 | .00188 | 73 | 27 | 1.17 |
| Miss M. | ♀ | 25 | 160 | 7.91 | 6.12 | 1.79 | .00172 | 77 | 23 | 1.075 |
| Dr. W. | ♀ | 28 | 160 | 7.86 | 5.71 | 2.15 | .00172 | 76 | 24 | 1.075 |
| Miss F. | ♀ | 23 | 150 | 8.05 | 5.85 | 2.20 | .00188 | 73 | 27 | 1.17 |
| Miss L. | ♀ | 22 | 140 | 7.91 | 5.74 | 2.17 | .00172 | 73 | 27 | 1.075 |
| Dr. M. | ♀ | 32 | 150 | 7.87 | 5.74 | 2.13 | .00172 | 73 | 27 | 1.075 |
| Miss S. | ♀ | 19 | 150 | 7.87 | 6.14 | 1.63 | .00172 | 79 | 21 | 1.075 |
| Miss Lom. | ♀ | 26 | 160 | 8.28 | 5.74 | 2.54 | .00172 | 69 | 31 | 1.075 |
| Miss Sch. | ♀ | 22 | 145 | 8.03 | 6.10 | 1.93 | .00172 | 76 | 24 | 1.075 |
| Averages... | ... | 27 | 163 | 7.94 | 6.20 | 1.74 | .00175 | 78 | 22 | 1.09 |

* In this column, ♂ indicates male, and ♀ female.
† This serum is not used to get average values.
‡ This subject had boils six months ago, though physical examination is negative now.
§ This man had eaten very little for several days.

he says, lie "in round numbers between 7 and 9 per cent." The average value equals 7.94 per cent.

2. The total albumins lie between 4.95 and 7.7 per cent., with an average value of 6.20 per cent., or between 67 and 89 per cent. of the total proteins, with an average value of 78 per cent.

3. The globulins lie between 1 and 2.54 per cent., with an average value of 1.74 per cent., or between 11 and 33 per cent. of the total proteins, with an average value of 22 per cent.

4. The nonproteins lie between 0.98 and 1.19 per cent., with an average of 1.09 per cent., and have a refractivity varying from 0.00158 and 0.00190, with an average of 0.00175.

The first seven results in the table are of interest. The first three were taken from the same person on

* From the Medical Division of the University of California Hospital, and the George Williams Hooper Foundation for Medical Research.

1. Robertson, T. B.: Jour. Biol. Chem., 1915, xxii, 233
2. Reiss: Ergebn. d. inn. Med. u. Kinderh., 1913, x, 531.
3. Reiss: Deutsch. Arch. f. klin. Med., 1915, cxvii, 175.

the same day, the first immediately on awakening, the second four hours after breakfast, and the third one hour after a hearty meal. The first two results are practically the same. The third result shows an increased proportion of albumin to globulin. Robertson[4] has observed that fasting in the rat produces an increase in the proportion of globulin in the blood serum, while our one observation gives an increase in the proportion of albumin soon after a hearty meal. This supplies an instance of the value of estimating the ratio of albumins to globulins. No peculiarity would have been discovered in this serum if Reiss' method had been used. The fourth and fifth serums and the sixth and seventh serums were taken from two subjects on different days at a time from three to four hours after breakfast, and no essential differences on different days were found. From this we conclude that, in order to obtain comparable results, blood should be taken from patients under comparable conditions. The specimens of blood used to establish our normal values have been taken either before breakfast, or from three to four hours after meals. (Serum 3 was not used in the calculation of the averages.) No appreciable amount of muscular work had been done immediately before the experiment by the subjects from whom we withdrew blood. We considered it unnecessary and unpractical to establish our normal from persons who had been in bed for twenty minutes before the withdrawal of the blood, as Reiss[3] advises.

No definite differences can be noticed in the results due to the age of the subjects. The percentage of globulin is consistently higher, however, in the women examined than in the men.

We have attempted in this series to give the mean values of the proteins in normal healthy subjects, and to indicate the normal variations above and below the mean. More observations are needed to bring out fluctuations due to such factors as diet, starvation and muscular effort.

Work in diseased conditions is to follow.

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## IMPORTANCE OF THOROUGH EXAMINATION IN UROLOGIC CASES*

A. J. CROWELL, M.D.
CHARLOTTE, N. C.

In presenting this paper, I desire to illustrate and emphasize the value of the use of every available aid at our command not only from a diagnostic but also from a therapeutic standpoint. For this purpose, I will briefly report a series of cases which lately came under my observation.

The first series is that of stone in the ureter and kidney; second, pyogenic infection; third, new growths, and fourth, tuberculosis.

It would be impossible to discuss any one of these conditions fully in the time allotted me, therefore these cases will be used only to illustrate and emphasize a few cardinal principles in the diagnosis and treatment of these cases.

Of the twelve cases of stone (nine ureteral and three kidney) I shall use for this purpose, five were reported negative from the Roentgen-ray department. These were in the ureters and were located by the use of the ureteral catheter. The first was lodged about 1 inch above the ureterovesical opening. Two unsuccessful efforts were made to dislodge it with the ureteral catheter and sterile oil. A suprapubic cystotomy was performed, the ureteral opening enlarged and the stone removed through it with some difficulty.

In the second case, in which the Roentgen ray was negative, the stone was twice located with the ureteral catheter about 3 inches below the kidney pelvis and two unsuccessful efforts were made to dislodge it. A left rectus incision was made and the peritoneum deflected from the left abdominal wall all the way from the anterior incision back to and over the ureter, and the stone was removed through a small ureteral incision. A cigaret drain was inserted through a stab wound in the back and the patient made a rapid and uneventful recovery.

The Roentgen ray was also negative in the third case, but the stone was located and dislodged by catheterization. The patient suffered several typical attacks of nephritic colic for six months before she was referred to us. In this case the left ureter was catheterized without difficulty and found to be functionating normally, but a decided obstruction was encountered in the right ureter 4 inches above the ureterovesical opening. This was finally passed and 8 ounces of urine were withdrawn from this kidney before it began functionating intermittently, which, of course, demonstrated a hydronephrosis. The catheter was then withdrawn below the point of obstruction and 2 c.c. of a 2 per cent. solution of cocain were injected. The latter was done with the hope that a relaxation of the muscular fibers of the ureter might be obtained and in this way the passage of the stone into the bladder secured. Relief followed, and on cystoscopy the second day thereafter, the stone was seen in the bladder.

There may yet be uric acid stones in this kidney, but the value of the ureteral catheter was forcibly demonstrated here, not only from a diagnostic, but also from a therapeutic standpoint, since we were enabled to dislodge the calculus and cause it to pass into the bladder.

The fourth case was that of ureteral stone producing the usual symptoms for two weeks previous to the time the patient came under my care. This we easily located with the Roentgen ray about 6 inches above the vesico-ureteral opening. The ureteral catheter was used here not only to verify the Roentgen-ray findings but to dislodge the stone if possible. Following the second ureteral catheterization, the injection of cocain and oil, the stone passed into the bladder and the patient, a physician, was spared an operation.

In the fifth case, the Roentgen-ray findings were negative. The symptoms were typical of nephritic colic. Firm percussion over the left kidney was unbearable. These symptoms had persisted for six days.

On ureteral catheterization, obstruction was encountered 9 inches above the ureterovesical opening. No urine was secured until this point had been passed, when 20 c.c. of a bloody urine were withdrawn.

The same procedure was followed in this as in the above-mentioned cases. The patient was prepared for operation the following day, but cystoscopy, before administering the anesthetic, enabled me to demon-

4. Robertson, T. B.: Jour. Biol. Chem., 1912, xi, 179; ibid., 1912, xiii, 225.

* Read before the Section on Genito-Urinary Diseases at the Sixty-Sixth Annual Session of the American Medical Association, San Francisco, June, 1915.

strate to my associates the cause of the greatly improved condition of my patient. The bladder was dotted with fragments of stone—one yet remaining in the ureteral opening. This was removed with the beak of the cystoscope.

In four other cases of ureteral stone—one of which was reported negative from the Roentgen-ray department—the patients were treated in the same way, but unsuccessfully with two. These stones had to be removed by operation.

The two cases in which this plan failed were not suitable for this procedure. The ureteral occlusion had persisted sufficiently long to inhibit the kidney function. This is very important, since the pressure behind the stone is kept up by kidney functional activity and forces the stone into the bladder while the muscular fibers of the ureters are under the influence of cocain.

Of these nine cases, the Roentgen-ray findings were negative in five and the diagnosis was made with the cystoscope, ureteral catheter and by means of the typical clinical symptoms. In the remaining four cases the Roentgen-ray findings were verified and five of the nine patients were spared operation.

Another valuable aid in diagnosing ureteral and occasionally pelvic stone is the wax-tipped ureteral catheter. Scratches in the wax made by them can easily be detected with a magnifying glass.

In all the cases of kidney stone in this series Dr. Squires was able to demonstrate them by roentgenography. In these, we found the ureteral catheter, in connection with the phenolsulphonephthalein test, of incalculable value in ascertaining the amount of kidney destruction produced by them and in determining the best surgical procedure to pursue. To illustrate, I will briefly report three cases of kidney stone which show the different degrees of destruction produced by them.

The first was a case in which there was a small stone in the kidney pelvis. Ureteral catheterization showed only a slight pyelitis and its functional activity normal. No kidney tissue had been destroyed. The stone was removed by pyelotomy. There was practically no leakage of urine following the operation.

In the second case the stone was much larger, extending considerably into the kidney parenchyma. Urine obtained by ureteral catheterization indicated only a moderate amount of pyogenic infection, but the phthalein test indicated considerable kidney destruction. In this case the stone was so large, though there was only a mild infection, that we decided nephrectomy advisable since it would be impossible to remove the stone without lacerating the kidney considerably in so doing. This would almost certainly be followed by a return of stone formation.

The third case was one in which we not only had to deal with a large stone, but active infection as well. The phenolsulphonephthalein output from this side was very poor. In this and the preceding case, the phenolsulphonephthalein output of the opposite kidney was good and we had no hesitancy in removing the stone-bearing kidney. These patients seemed to suffer no inconvenience following nephrectomy and made excellent recoveries.

Of the great number of cases of pyogenic infection which have fallen into our hands, I shall, instead of reporting individual cases, speak of the types of most importance and the means of arriving at a diagnosis and of ascertaining the plan of treatment that should be instituted. (Deviating a little, I will say that the channel through which infection takes place in these cases depends principally on their predisposing causes, that is, whether it occurs through the hemic or lymphatic circulations or by ureteral ascent. The majority of the parenchymatous infections, of course, is through one of these circulatory systems and the source of such infections may be in any part of the body. The predisposing causes of infection through the urinary bladder are stricture, hypertrophy of the prostate, or any condition or disease interfering with the normal elimination of the urine. To ascertain, then, just the nature and extent of these various infections, ureteral catheterization, functional activity tests and bacteriologic examination of urine thus obtained is absolutely necessary, not only from a diagnostic standpoint, but also for the purpose of securing bacteria for autogenous vaccination. An ascending infection with normal ureters practically never occurs, as the urine is constantly flushing the ureters from above downward. In this way nature protects herself. But with residual urine, infected bladder and dilated ureters, ascending infection is very common.)

An idea as to the location of pathologic conditions in the urinary tract may be obtained by the ordinary chemical and microscopic examinations of the bladder urine, but to ascertain definitely the location and extent of these, the ureteral catheter and functional tests are absolutely indispensable. Pus in urine thus obtained means infection and the extent of this infection, that is, whether it be limited to the pelvis or extend into the parenchyma of the kidney, may be ascertained by the quantity of pus thus secured and the functional activity ascertained by the phenolsulphonephthalein test. For instance, if we have a pyelitis, pus and blood are secured by ureteral catheterization, but the functional activity is normal. The exciting cause of this pyelitis may be ascertained by bacteriologic examination. If the secreting portion of the kidney is involved as well, then the functional test will be affected in proportion to the amount of kidney destruction.

An illustration of the value of ascertaining the phenolsulphonephthalein output is shown in the following case of tumor of the kidney.

Mr. B. H., aged 38, consulted me for intermittent painless hematuria. The ureters were cathetrized and I found that the blood was coming from the right kidney, but no pus was secured. The phenosulphonephthalein output was about normal and the two kidneys equal in their secretory power. The patient presented himself from time to time for examination extending over a period of eight or ten months. With each subsequent ureteral catheterization the output of the right kidney grew less and that of the left greater until it was more than double that of the opposite kidney. The diagnosis of hypernephroma was made. The kidney was finally removed and the diagnosis sustained by the pathologist.

Several cases of hypernephroma have fallen into my hands but none so early and in which the progress was watched so closely or the value of the phenolsulphonephthalein output so forcibly demonstrated as in this case, but in all of them it has been in proportion to the kidney parenchyma destruction.

Two cases of tuberculosis of the kidney illustrate, first, the importance of recognizing and properly interpreting its early symptoms; second, some simple

methods of making accurate diagnosis, and third, points of value which will aid us in determining our plan of treatment.

The first case is that of early primary tuberculosis. This was referred to me as one of subacute cystitis, the symptoms probably being augmented by bladder stone. Urination was frequent both day and night, from the beginning. This, with only a small amount of pus and practically no blood, at once led us to suspect tuberculosis of the kidney. Cystoscopy showed marked congestion of the trigon with slight ulceration around the right ureteral opening. Urine obtained from this kidney showed the presence of a trace of albumin, a moderate amount of pus cells and an occasional blood corpuscle. A centrifugalized specimen was injected into the peritoneal cavity of a guinea-pig. A specimen was also stained and tubercle bacilli found. The patient could not be operated on at once but returned in five weeks for this purpose. At that time the pig was killed and the peritoneum, liver and kidneys were found to be filled with tubercles.

The patient's kidney was removed and the lower third found to be filled with small tubercles, but with no abscess formation. His urine, which had previously been filled with pus, immediately cleared up and the bladder symptoms subsided. The patient gained 25 pounds in weight in two months. At present, twelve months after, there is no evidence of tuberculosis anywhere in the body and the patient is in excellent health.

The second case was one of two years' standing. The patient suffered intensely with cystitis and lost 93 pounds in weight during this time. On account of extreme sensitiveness of the bladder and its decreased capacity, ureteral catheterization was accomplished with much difficulty. In fact, several efforts were made before we succeeded in catheterizing his left ureter. An ulcer, located at its opening, made it unusually difficult.

The urine secured from the right kidney was filled with pus and tubercle bacilli. The phenolsulphonephthalein output was very poor. No bacilli, pus or blood were found in the urine from the left kidney, but tuberculous peritonitis was produced in a guinea-pig with urine from this, as well as from the right. These bacilli probably came from the ulcer at the ureteral opening. With a negative urine, however, a 40 per cent. phenolsulphonephthalein output of the opposite kidney the first hour, and with the great probabilities of this kidney becoming involved, if it had not already become so, I had no hesitancy in removing the right kidney. This was done six months ago; the patient rapidly gained in weight and strength and his bladder symptoms wonderfully improved in a very short time and he is now free from suffering and apparently a well man.

In determining kidney functional activity we have found blood urea estimation in connection with the phenolsulphonephthalein test of incalculable value. It is of especial service following prostatectomy. In these cases, the urine cannot be accumulated to estimate the phenolsulphonephthalein output and the blood can always be obtained and the urea retention estimated.

Of all the functional tests we have used, we find ourselves relying more and more on these two and in our experience, as the phenolsulphonephthalein increases, the urea decreases and vice versa. The latter furnishes evidence of impending uremia but it should always be used as an adjunct, since the determination of the cumulative phenomena is of great prognostic value, although its absence may be misleading, which makes it necessary to ascertain the combined results of these tests.

### CONCLUSIONS

1. Every available means should be employed for diagnosing and determining the best therapeutic measures to pursue in diseased conditions of the genito-urinary tract.

2. The majority of ureteral stones can be removed by the injection of cocain and oil, provided the ureters are normal and it is done soon after impaction.

3. The kidney functional tests, especially phenolsulphonephthalein and blood urea, are of the utmost importance in determining the condition of the kidneys before operation, and that after prostatectomy, the blood urea, which must then be used alone, is of the greatest value.

Realty Building.

## THE MECHANISM OF URINATION*

ARTHUR B. CECIL, A.B., M.D.
LOS ANGELES

The mechanism of urination has not been determined in all its detail, but a large amount of work has been done, and by correlating the work of the anatomist and the physiologist with that of the clinician, the physiology of urination can scarcely longer be regarded as problematic.

Enough has been determined to be of great assistance in the diagnosis of diseases of the urinary tract, and to establish definite principles of inestimable practical value in genito-urinary surgery.

It must be admitted that many of the unsatisfactory results following operations on the bladder neck and urethra have been due to a disregard for the underlying principles of the physiology of the mechanism of urination.

It is the purpose of this paper to present in a correlated form the present status of knowledge of the act of urination, together with some observations which I have carried out on the physiology of the bladder and urethra.

The nervous mechanism is especially complex and interesting. For a number of years it has been maintained that in animals, at least, there are centers of urination outside of the spinal cord. Experiments of Sokowin (1784), Nussbaum (1879), Nawroki and Skadichewaki (1891), and Justchenke (1897), have demonstrated that the inferior mesenteric ganglion contains a reflex center for vesical contraction.

Von Zeissl,[1] from his researches, concluded that there are centers for urination within the bladder wall itself. This observer divided all of the nerves to a dog's bladder, that is, completely isolated the bladder from the central nervous system, and the sympathetic ganglia of the pelvis, and in spite of this the animal retained urine and emptied the bladder in a normal manner.

* Read before the Section on Genito-Urinary Diseases at the Sixty-Sixth Annual Session of the American Medical Association, San Francisco, June, 1915.

1. Von Zeissl: Ueber die entnervente Blase, Wien. klin. Wchnschr., 1896, ix, 394.

Goltz and Ewald[2] removed the sacrolumbar cord and part of the dorsal cord in dogs and after a short time they found that the bladder emptied itself regularly at definite intervals.

In 1901, Muller,[3] from his observations and experiments, arrived at the conclusion that the reflex centers of urination are not situated in the spinal cord at all, but are exclusively placed in the sympathetic ganglia. Muller extirpated the cord in four dogs, and according to him, after a few weeks the bladder showed automatic functioning, without leakage in the interval between voidings. He ascribed to the spinal cord only trophic centers.

The new idea, as brought out by Muller, seemed to completely overthrow the classical views as to the physiology of the conus terminalis, and his views have been accepted by a large number of observers, while others, though admitting the existence of sympathetic centers, have superimposed on them the spinal center. It is still a difference of opinion, among this latter group, as to whether the sympathetic centers are capable of carrying on normal reflex vesical function after destruction of the conus terminalis or cauda equina.

Van Gehuchten considers that the sympathetic centers can functionate independently of the cerebrospinal centers.

Oppenheim, on the other hand, claims that the reestablishment of the vesical rectal function by the sympathetic centers takes place in a wholly imperfect manner.

The researches of Roussy and Rossi[4] on monkeys and dogs to determine the location of the bladder center and the effect of various lesions of the conus terminalis on the bladder function, are most interesting and convincing. In a certain number of animals they completely removed the conus terminalis or divided all the nerves of the cauda equina.

In another series they divided the spinal cord above the conus. In animals in which they destroyed the conus terminalis, or divided the cauda equina, there was complete paralysis of the bladder and its sphincters. Urine leaked from the bladder, drop by drop, as it entered it, or there were passages of small quantities coincident with movements of the animal, such as barking, etc. So that in these animals there was a picture of the atonic bladder, and this persisted during the life of the animals, many of which were kept alive for several months.

There was no such resuming of the bladder function as had been described by those who claimed the location of the bladder center to be outside of the spinal cord.

In those animals in which the cord was divided above the conus there was at first, for about three days, complete retention of urine. After this urination took place during the whole life of the animal in streams of urine with definite intervals without, as a rule, loss of urine in the interval.

The bladder resumed a reflex periodic emptying. They, therefore, concluded that the so-called sympathetic centers are utterly incapable of resuming, in anything like a normal manner, the function of the bladder when these centers are isolated from the spinal cord, and that the true center of urination lies within the conus terminalis.

They do not deny, however, the existence of extraspinal centers or the existence of centers within the bladder wall itself. But it would seem that they did definitely establish that these centers cannot carry on vesical function independent of the spinal cord.

The course of the peripheral nerves has been worked out by a large number of anatomists and physiologists, and the essential facts are now well established. In general, motor fibers are found in the second and third sacral roots and in the nervus erigens. The fibers of the sympathetic group are carried regularly in the third, fourth and fifth lumbar roots. These fibers pass through the sympathetic chain by a varying number of strands to the inferior mesenteric ganglion, and from this ganglion the hypogastric nerves arise.

The hypogastric nerves carry the impulse to the hypogastric plexus, which is formed by a union of the hypogastric nerves with branches of the nervus erigens.

From the hypogastric plexus terminal branches are distributed to the bladder.

It has been thought by certain observers that they had demonstrated vesicomotor fiber in the sympathetic other than those carried by the hypogastric nerves.

Stewart,[5] however, was unable to confirm their findings, in that when he sectioned the hypogastric nerves, leaving only the sacral paths open, and then subsequently cut the sacrospinal nerves, stimulation of the cord in every instance failed to produce bladder contraction.

The course of the sensory nerves has been somewhat more difficult to determine, inasmuch as stimulation of almost any sensory nerve of the body will produce a reflex contraction of the bladder.

Certain points, however, have been well established. It is definite that the sacral nerves contain sensory fibers from the bladder, which, when stimulated, produce a reflex through the cord and the sacral nerves.

These sacral nerve sensory fibers are part of an arc which is limited to the sacral nerve-cord reflex, inasmuch as they are not capable of exciting a reflex contraction of the bladder through the hypogastric nerves.

It has also been shown that the hypogastric nerves contain bladder sensory nerves. These fibers when stimulated produce a reflex contraction of the bladder, but this reflex is through the inferior mesenteric ganglion, for it takes place even though the ganglion be entirely isolated from the cord. This reflex, however, has been considered by Langley a pseudoreflex or axon reflex.

Griffiths[6] has described a third reflex occurring through the ganglion cells of the hypogastric plexus, and lastly, as pointed out above, some have maintained the existence of intravesical centers which functionate in spite of the isolation of the bladder from its spinal and sympathetic connections.

The exact function of the hypogastric nerves and of the sacral nerves is in doubt.

Von Zeissl,[7] from his investigations, concludes that the bladder conforms to the law of crossed innervation. The nervus erigens is motor for the body and inhibitory for the sphincter, while the hypogastric

2. Goltz and Ewald: Arch. f. d. ges. Physiol., viii, ix, lxiii.
3. Muller: Ztschr. f. Nervenh., xxi, Parts 1 and 2.
4. Roussy and Rossi: Troubles de la miction, et de la défécation consecutifs aux lésions expérimentales du cone terminal ou de la queue du cheval. Cong. internat. de méd., Compt. rend., Budapest, (1909) 1910, Section xi, neuropatol., p. 438.
5. Stewart: Am. Jour. Physiol., 1899, ii, 182.
6. Griffiths: Jour. Anat. and Physiol., 1894-96, xxix, 61.
7. Von Zeissl: Jour. d'urol. méd. et chir., 1893, p. 828; Arch. f. d. ges. Physiol., 1898, liii, 560.

nerves are motor for the sphincter and inhibitory for the body, or as Strominger[8] puts it, the lumbar center retains the urine while the sacral center expels it. This view is not conformed to by all observers; thus, Louget considers that the sacral nerves control the sphincter while the sympathetic nerves control the body.

Langley and Anderson[9] and Stewart[10] consider that stimulation of the hypogastric nerves differs only in degree from stimulation of the sacral nerves.

Langley[11] has more recently demonstrated the presence of inhibitory fibers in the sacral nerves.

Although stimulation of the hypogastric nerves will often produce contraction of the bladder, usually followed by a much greater dilatation, and stimulation of the sacral nerves usually produces a contraction of the bladder, stimulation of either nerve or of the cord will often produce a dilatation of a previously contracted bladder.

Two views have been held as to the manner in which the sensory nerves are stimulated to give a conscious sensation of the desire to urinate. According to Goltz[12] the distention of the bladder finally calls forth a reflex contraction which squeezes a few drops of urine into the posterior urethra, and the sensation of the desire to urinate arises from the stimulation of sensory nerves of the posterior urethra. A second theory is that the desire to urinate arises from stimulation of sensory nerves of the bladder itself from distention with urine. In support of Goltz's view has been set forth the fact that instrumental or chemical or inflammatory stimulation of the posterior urethra causes a desire to urinate. The fact, however, that this sensation may be thus produced is by no means proof that normally the desire to urinate arises from stimulation of nerves of the posterior urethra. This is perhaps a provision for the complete emptying of the urethra. Against Goltz's view and in favor of the view that the desire to urinate arises from stimulating of the sensory nerves of the bladder itself, is an overwhelming amount of evidence.

Thomson Walker[13] in observations on cases in which the whole posterior urethra had been removed by suprapubic prostatectomy found that there was no difference in these cases in the sensation of desire to urinate and concludes that the prostatic urethra is not concerned in, or is not necessary for, the initiation of natural urination. It might also be pointed out that in many cases after prostatectomy the posterior urethra becomes a part of the bladder and thus is almost constantly full of urine, and yet it is only when the bladder has reached a certain distention that the patient has a desire to urinate. This desire, so far as I have been able to make out, does not differ in any way from the normal sensation.

Mosso and Pellacani,[14] from experiments on women in measuring the volume of the bladder, came to the conclusion that the sensation of fulness and desire to urinate was caused by stimulation of the sensory nerves of the bladder.

Leedham-Green,[15] from roentgenograms of the bladder, failed to find evidence of the opaque medium in the posterior urethra.

It would seem, then, that Goltz's view is no longer tenable, and that the sensation of fulness of the bladder and the sensation of desire to urinate arises solely from stimulation of sensory nerves of the bladder itself and does not come about under normal conditions from stimulation of the nerves from the posterior urethra, although it is evident that stimulation of the posterior urethra does give the sensation of urinary pressure.

The question of the origin of the desire to urinate is closely allied with the function of the sphincter muscles of the bladder.

Henle, from his observations that fibers of the detrusor muscle were inserted between those of the internal sphincter, supposed that the internal sphincter was pulled open by a contraction of the detrusor muscle.

Zuckerkandl[16] has shown that most of the fibers of the detrusor muscle are inserted not between the fibers of the internal sphincter but are attached to the upper part of the prostate. Here, too, the internal sphincter would be regarded as a passive sphincter, as was regarded by Rosenthal[17] as far back as 1857, a view which has no support today.

As will be shown later, there can be no doubt that the external sphincter is capable of retaining urine in the bladder, not by an intrinsic elasticity, but by a tonic contraction, which is capable of being inhibited. There is no reason, therefore, to assume that the internal sphincter cannot and does not maintain bladder closure by tonic contraction.

The question of the function of the internal sphincter and of the sphincter urethrae has long been a debated one.

Guyon[18] and Finger[19] considered that the internal sphincter is too weak a muscle to play a great part at least in retaining urine in the bladder. They considered that when a moderate distention of the bladder had been reached, the internal sphincter is overcome and that a bladder neck is formed so that the prostatic urethra becomes part of the bladder cavity. Under moderate distention, then, the bladder is, according to this view, closed by the internal sphincter, but when fully distended the compressor urethrae muscle maintains bladder closure.

This view, then, necessarily maintains the existence of the formation of a bladder neck in a fully distended bladder; and Finger attempted to prove that such was the case by passing a catheter and noting the distance to which it had been introduced before urine began to flow. When the bladder was moderately full, but the patient had no desire to urinate, it was necessary to pass the catheter from 1 to 1.5 cm. farther than when the bladder was fully distended, and there was a marked desire to urinate; but as Leedham-Green[20] points out, if the posterior urethra had become a part of the bladder the difference should not be so slight, but should amount to the length of the entire posterior urethra or about 4 cm.

Volcker and Lichtenberg,[21] by filling the bladder with collargol, demonstrated that the internal vesical

8. Strominger: Rev. clin. d'Urol., 1914, p. 385.
9. Langley and Anderson: Jour. Physiol., 1895-1896, xix, 71.
10. Stewart: Am. Jour. Physiol., 1899.
11. Langley: Jour. Physiol., 1910, xl.
12. Goltz: Arch. f. d. ges. Physiol., 1874, viii, 478.
13. Walker, Thomson: Clin. Jour., xl, No. 17, p. 261.
14. Mosso and Pellacani: Arch. ital. de. biol., 1882, p. 1.
15. Leedham-Green: Brit. Med. Jour., 1906, ii, 297.
16. Zuckerkandl: Eulenburg's Realenzyklopädie, Ed. 3, 1894, iii, 331.
17. Rosenthal: Diss. Konigsberg, 1857.
18. Guyon: Gaz. hebd. de. méd., 1884; Leçons clinique sur les maladies des voies urinaires, 1896.
19. Finger: Allg. Wien. med. Ztschr., 1893; Die Blenorrhöe der sexual Organe, 1905.
20. Leedham-Green: Brit. Med. Jour., 1906, ii, 297.
21. Volcker and Lichtenberg: Die Gestalt der menschlichen Harnblase in Röntgenbilde, Muenchen. med. Wchnschr., 1905. Cystographie und Pyelographie, Beitr. z. klin. Chir., 1906-1907, lii.

sphincter is the sphincter that prevents the escape of fluid from the fully distended bladder. They never observed the formation of a bladder neck.

To determine this point Leedham-Green injected the bladder of men and youths with a suspension of bismuth and then roentgenographed the pelvis. The observer states, "In every case, I found that whether the bladder was fully distended or not the outline of the organ was oval and not pear shaped, and the urethra was sharply cut off from the bladder without a suggestion of a bladder neck."

Barringer and MacKee,[22] Uhl and MacKinney,[23] and A. Hyman,[24] using practically the same method of filling the bladder with an opaque medium, have all reached the same conclusion, that under normal conditions the internal vesical sphincter maintains bladder closure, and without exception they have failed to demonstrate the formation of a bladder neck.

Physiologists have been somewhat loath to accept the view that the internal sphincter maintains bladder closure, as it would seem to present an example of volitional control of unstriped muscle. There is, however, an example of this in the accommodation muscle of the eye, and the striking example of volitional control of unstriped muscle has been reported by Maxwell[25] in which a young man had the power of voluntary erection of the hair. Another explanation has been offered for the apparent volitional control of unstriped muscle and that is, that it is a reflex voluntarily initiated.

Rehfisch,[26] to prove that the internal sphincter muscle is capable of voluntary contraction, filled a man's bladder and then introduced a catheter so that its opening lay in the posterior urethra through the external sphincter muscle. The man could discharge and retain his urine at request.

From my own observation on cases in which I have performed Young's perineal prostatectomy I am convinced that not only is the internal sphincter muscle capable of maintaining bladder closure independently of the external sphincter muscle, but that it is to all intents and purposes under volitional control.

I am also convinced that the external sphincter muscle can maintain bladder closure independently of the internal sphincter muscle and do so in a reflex manner. This operation provides wonderful opportunity for determining just this point, inasmuch as the opening for drainage from the urethra is between the internal sphincter muscle and compressor urethrae muscle.

In this operation a small slit-like incision is made in the membranous urethra after the compressor urethrae muscle, triangular ligament and transverse perineal muscles have been retracted forward. Enucleation is then carried out subvesically. We have then an opening in the urethra between the external and internal sphincter muscles with, in many cases, a perfectly intact vesical neck.

It is not at all uncommon to see the internal sphincter muscle within a few days regain its function and the patient retain urine in the bladder and volitionally expel it from the perineal wound. It is also possible for him to close the bladder after part of the urine has been passed.

It is evident that in these cases the bladder closure is carried out entirely by the internal sphincter muscle and that this muscle will act volitionally. In further support of the theory that the internal muscle is capable of maintaining bladder closure and is under volitional control, is the fact that incontinence of urine very rarely follows external urethrotomy for stricture with section or destruction of the external sphincter muscle, and the cases in which it does follow might be explained by destruction of the internal sphincter muscle by long distention with urine.

A question of very great importance to the genito-urinary surgeon is whether the compressor urethrae muscle can act in a reflex manner and maintain closure of the bladder independently of the internal sphincter muscle.

As has been shown by Zuckerkandl in cases of prostatic enlargement, due to adenomatous growths, the internal sphincter muscle is sometimes enormously dilated by the growing of the adenoma through it.

Thomson Walker[27] was perhaps, the first to point out that in many cases the internal sphincter muscle is destroyed or rendered permanently useless by this distention. He noted that in necropsy on patients dying after prostatectomy there was frequently a large cavity of bladder neck remaining.

Hyman,[28] and Wallace and Page,[29] by making roentgenographic pictures of the bladder after prostatectomy, conclusively demonstrate that in many cases the internal sphincter muscle is not only functionally useless, but that the posterior urethra forms a bladder neck and that closure of the bladder is at the point of the compressor urethrae muscle.

Again, observations which I have carried out on cases following Young's perineal prostatectomy seem to definitely establish this point. In some of the cases in which a large adenoma has been removed, urine is frequently passed through the perineal wound without interruption until this wound closes, when the patient has perfect control of urination. It might be assumed that, in the cases of enlarged prostate, the external sphincter muscle had assumed a function which it does not normally possess, that with destruction of the internal sphincter muscle and a disturbance of its function by the growth of adenoma throughout it, the external sphincter muscle had gradually taken on itself a reflex ability to maintain constant bladder closure.

I believe that this possibility can be definitely ruled out and that the following clinical observation is of interest in this connection.

A patient, aged 83, consulted me on account of not being able to urinate, and having to use a catheter. Examination showed a small fibrous prostate and cystoscopic examination showed a well-defined posterior bar. A Young's perineal prostatectomy was done and after removing the fibrous prostatic tissue I found that there was an extremely contracted vesical neck, which I dilated with glove stretchers. Five days later it was found that the obstruction had not been relieved and that the patient had retention of urine. I immediately did a Young's punch operation, introducing the instrument through the perineal wound. The vesical neck was freely divided. Following this, urine

22. Barringer and MacKee: Radiographs of the Bladder and Bladder Neck, Tr. Am. Urol. Assn., 1912, p. 408.
23. Uhl and MacKinney: Observations upon the Mechanism of Urination, Urol. and Cutan. Rev. (Tech. Sup.), July, 1913.
24. Hyman: The Normal Bladder and Its Sphincters and the Changes Following Prostatectomy, Ann. Surg., April, 1914, p. 544.
25. Maxwell: Am. Jour. Physiol., 1902, vii, 369.
26. Rehfisch: Virchows Arch. f. path. Anat., cl, 195
27. Walker, Thomson: Brit. Med. Jour., October, 1905, p. 865.
28. Hyman: Ann. Surg., lix.
29. Wallace and Page: Brit. Med. Jour., Nov. 25, 1911, p. 1405.

drained without interruption through the perineal wound for about three weeks, when a catheter was passed into the bladder through the urethra, and the perineal wound closed that day. Two days later the catheter was removed and urination was found to be normal in every respect as had been expected. It is evident that in this case there was what might be called an internal sphincter incontinence, but that when the perineal wound closed the external sphincter was brought into play, giving the patient perfect urinary control.

It is to be noted also that the external sphincter muscle assumed this control without having to be educated to new conditions. In this connection it is also worthy of note that in a large number of cases in which Young has performed his punch operation, not a single case of incontinence of urine, for even the shortest time, has followed.

Chetwood's galvanocautery operation for stricture of the vesical neck has occasionally, in some hands, resulted in incontinence of urine. This is no fault of the operation itself, in so far as dividing the internal vesical sphincter is concerned, but undoubtedly has resulted from division of the compressor urethrae muscle when incising in the perineum on a sound in the urethra for the purpose of introducing the galvanocautery.

It is believed that if the instrument was introduced as Young's tractor is introduced after the triangular ligament had been retracted forward, incontinence of urine would never follow.

From roentgenograms and from observations on operative cases in which the external sphincter muscle has been excluded, there can be but little doubt that the normal internal sphincter muscle is thoroughly capable of maintaining bladder closure and that to all intents and purposes it is under volitional control. It is also certain that the external sphincter muscle (compressor urethrae muscle) is alone capable of maintaining bladder closure and of acting in a reflex manner.

It would not seem that the subject had been covered without saying something in regard to incontinence of urine following prostatectomy.

The operation of median perineal prostatectomy entirely disregards the physiology of the mechanism of urination and it does not seem remarkable that many cases of incontinence of urine have followed prostatectomy by this method. The only thing that prevents incontinence of urine following this operation is that by chance the internal sphincter muscle might regain its function following the removal of an enlarged prostate through it; or that, by chance, the external sphincter muscle might heal and be restored to function. This operation must not be confused with Young's perineal prostatectomy, an operation after which incontinence of urine should never follow, inasmuch as not only is the internal sphincter muscle preserved for whatever value it may possess, after having been distended by the prostatic adenoma, but that by going in between the transversus perinei muscles and the levator ani, retracting the triangular ligament forward, the external sphincter muscle is preserved.

In one of Young's early series of 540 perineal prostatectomies, he had three cases of incontinence of urine, and frankly states that two of these were due to getting in anterior to the triangular ligament.

In conclusion it might be said:

1. The bladder center is situated in the conus terminalis of the spinal cord.

2. The so-called sympathetic centers are incapable of carrying on, in anything like a normal manner, the mechanism of urination.

3. The desire to urinate arises from stimulation of the sensory nerves of the bladder and not from stimulation of the sensory nerves of the posterior urethra.

4. The internal sphincter muscle normally maintains bladder closure.

5. Although the internal sphincter muscle is plain muscle it is to all purposes under volitional control.

6. The external sphincter muscle is capable of maintaining bladder closure and does not have to be educated to perform this task.

7. Either the external or internal sphincter muscle can, if necessary, be destroyed without interfering with the function of retention of urine, *providing the remaining muscle is in a normal condition.*

8. Median perineal prostatectomy, inasmuch as in this operation the external sphincter muscle is divided and the internal sphincter muscle is liable to be rendered useless by the prostatic growth, is likely to result in incontinence of urine.

Incontinence of urine does not follow Young's perineal prostatectomy, in that in this operation the external sphincter muscle is preserved.

400-401 Marsh-Strong Building.

## ABSTRACT OF DISCUSSION

DR. MARTIN KROTOSZYNER, San Francisco: Dr. Cecil's paper calls to mind the not very rare occurrence of urinary disturbances that are apparently located in the prostatic urethra, but which in reality are due to some lesion of the urinary center in the lumbar spine. These cases are characterized by difficulties of micturition simulating involvement of the prostate gland, and, as a rule, also demonstrate cystoscopic changes, like trabeculosis, generally seen in prostatism.

DR. FRANK HINMAN, San Francisco: The contribution of Dr. Cecil is important from a surgical standpoint, as it emphasizes the interrelationship of the two sphincters. It is important, before an external urethrotomy, for instance, to know that the internal sphincter is intact, and one would, therefore, hesitate to perform an external urethrotomy on one who had previously had his prostate removed. I can testify to the conservative character of Young's perineal operation in an experience of twenty cases without one death or one case of complete incontinence. In several of these cases the internal sphincter was unquestionably inactive, so that continence was due to the preservation of the external sphincter. Incontinence is of two kinds, false and true. False incontinence has been attributed to inaction of the internal sphincter in which the posterior urethra becomes a part of the bladder. The incontinence expresses itself in an imperative desire to void without the ability apparently of waiting when this desire comes. True incontinence is a condition in which both sphincters are inactive.

DR. GRANVILLE MACGOWAN, Los Angeles: I wish to say that I have never seen any incontinence of urine following a properly performed suprapubic prostatectomy. I have seen a number of cases following Young's operation, when not performed in a proper manner. This is a thoroughly scientific operation, but one which the ordinary surgeon is incapable of performing. That is the reason why so many cases of incontinence of urine follow the operation.

DR. A. B. CECIL, Los Angeles: In looking over the literature for the last four or five years on the question of urinary control, I found that the whole physiology of the mechanism of urination was considered more or less a mystery,

that incontinence of urine was something that might or might not happen following prostatectomy, and that when it did there was no explanation for it.

I wondered why it was that some operators had reported numerous cases of incontinence of urine following perineal prostatectomy, because I really never have seen but one case of incontinence of urine following Young's operation. The whole reason of this discrepancy was because the mechanism of urination was by some operators disregarded. If one carries out the procedure as advised by Alexander to divide freely the external sphincter muscle, we would surely expect to get a certain number of cases of incontinence of urine. From the very first Dr. Young in perineal prostatectomy preserved that muscle, and if we preserve the external sphincter muscle in these operations, incontinence of urine will not follow. There is no mystery about it.

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## DIAGNOSES AND CERTIFICATES OF DEATH

### WITH ESPECIAL REFERENCE TO CANCER*

JOSEPH S. LEWIS, M.D.
BUFFALO

The life of a health officer is often spared by certain phases of human frailty with a humorous side. Among the complaints which come over the wire to the health department of Buffalo are such as these: "My husband is a pest and I want him removed." (A nuisance, evidently, to be abated.) "I want someone to do my washing, I can't get around to it." "Please send someone to kill off the cockroaches in my house. They are so thick that yesterday they stopped the clock." Such breezes serve to cool the fevered brow of the registrar of vital statistics while he wrestles with the problem of translating death certificates into figures qualifying and summarizing human mortality. When the registrar finds "asthenia," "neurasthenia," "Christian Science" or "climacteric," seriously certified as cause of death and ventures a mild protest, he is usually bidden to write a better one if he knows of one. How vital are vital statistics need not be urged here at length. Let any skeptical practitioner simply ask himself what would become of the science of preventive medicine without the knowledge of the whereabouts and extent of preventable disease, and the answer must solve his doubt as well as remind him of an important duty toward humanity. The importance of studying this question of the correctness of statistical diagnosis is less aid to the clinician who carries through his case conscientiously than for the sake of vital statistics. You may name a condition anything, or as many things as you please at the bedside, provided you treat your patient wisely, but for the Bureau of Census the diagnosis can be but one thing, and that as near as careful reflection can arrive at the truth. Nevertheless a preeminent clinician may be so far from connecting cause with effect as to quote with assurance death rates weakened by his own carelessness or impatience in writing out a death certificate.

For some time, in pursuit of the reason for the real or phantom increase in the death rate for cancer, I have been increasingly impressed with the importance of the question, "What of the diagnosis?" Death rates by cause depend largely for their accuracy on the accuracy of the individual physician both in determining and in recording the cause of death. It follows that the figures are certain when the physician is certain, and contrariwise.

In certain causes of death, doubt as to relative frequency is within limits so narrow as to be negligible, for example, in all deaths due to violence. Next to violence come the contagious diseases like smallpox, whooping cough or scarlet fever. Their universally recognizable signs and symptoms and their contagious nature make their diagnosis and reporting practically certain. All deaths followed by necropsy are likewise accurately reported, but in the absence of universally performed necropsy are of value only in proportion to their number. The value of such accurate data alone more than compensates for the labor and expense of gathering all. Of most doubtful value is the summary of causes that arise from conditions that remain hidden within the body cavities without clinical laboratory confirmation or necropsy. The sources of error which tend to vitiate accuracy in the latter class of certificates are many. The important ones are obscurity of the disease, lack of time and opportunity for study of its course, the lack of acumen of the physician, his unwillingness to take pains with the death certificate, and finally the interpretation by the registrar of the physician's interpretation of the signs and symptoms. The literature on the subject of diagnosis, as such, is scanty. How often is the diagnosis right? Do mistakes of omission and commission counterbalance and give approximately correct results, or are the figures subject to false inflation and deflation as the result of fads or educational propaganda?

Cabot[1] made a serious attempt to contribute something on this theme. From the printed discussion of his paper we deduce perfunctory commendation by some who heard the paper and a sweeping denunciation of the work, by Dr. A. C. Croftan of Chicago in subsequent letters to THE JOURNAL. Dr. Cabot's statements have received further confirmation in a report out of Bellevue Hospital.[2] Ash[3] contributes data concerning mistaken diagnoses in tuberculosis, and Bissell and LeCount[4] have discussed the diagnosis of coma. Greenwood and Wood[5] also present a significant discussion concerning the mortality from cancer. As physicians it is one of our most common weaknesses, arising from the patient's abhorrence of perplexity, that we fear to face our own diagnoses save in the dark. With a necropsy in prospect, few of us care to commit ourselves to a concise cause of death as we inevitably must, on a death certificate.

It was with the hope of throwing some light on this subject that I undertook a perusal of all death certificates issued in Buffalo for the year 1914, and by way of comparison, for the year 1894. It was a tedious work though punctuated with lighter moments as previously mentioned. A word as to the average physician's average opportunity (reference to ability

* The term cancer as used in this article includes all varieties of malignant neoplasm.

† From the State Institute for the Study of Malignant Disease.

1. Cabot, Richard C.: Diagnostic Pitfalls Identified During a Study of Three Thousand Autopsies, THE JOURNAL A. M. A., Dec. 28, 1912, p. 2295.

2. Clinical Diagnoses and Necropsy Findings in Bellevue, Miscellany, THE JOURNAL A. M. A., April 18, 1914, p. 1279. For further confirmation as regards cancer see Rep. Imperial Cancer Research Fund, London, 1905, No. 2, Part I.

3. Ash, J. E.: The Pathology of the Mistaken Diagnoses in a Hospital for Advanced Tuberculosis, THE JOURNAL A. M. A., Jan. 2, 1915, p. 11.

4. Bissell, Wayne W., and LeCount, E. R.: A Consideration of the Relative Frequency of the Various Forms of Coma, THE JOURNAL A. M. A., March 27, 1915, p. 1041. Also, Why Physicians Err in Diagnosis, editorial, ibid., p. 1076.

5. Greenwood and Wood: On Changes in the Recorded Mortality from Cancer, Proc. Roy. Soc. Med., 1914, vii, 119.

is studiously avoided) to make use of all the helps that modern medicine has to offer, will not be out of place. In 1914, in Buffalo, an average American city, of about half a million inhabitants, the deaths were about seven thousand. The births for the same year were about twelve thousand. Now of these twelve thousand births, five thousand were attended by midwives. These five thousand midwifery cases called for at least five thousand out of twelve thousand families in which medical practice in serious cases is conducted under the following regulations. First, no physician to be called until the patient can bear it no longer, usually at night; second, the physician is not to come again until called for; third, the physician's pay is inadequate so that he must in such cases make too many calls a day, to give each case attention that will stand scientific criticism. In 1914, some four hundred certificates were made by the medical examiner or city diagnostician on evidence obtained after death without necropsy in nontraumatic cases in which criminality was not suspected. I think it fair to assume that most deaths certified to under such circumstances render diagnoses so subject to error as to be mere guesswork. The large majority of these deaths were, for adults, some disease of the heart or blood vessels, for infants, malnutrition or convul-

TABLE 1.—PROGRESS SHOWN IN BETTER PREPARATION OF DEATH REPORTS IN 1914 AS COMPARED WITH 1894

| | Total Deaths | Given Cause Doubtful | Improperly Arranged or Worded | Conflict of Two or More Given Causes |
|---|---|---|---|---|
| 1894 | 5,280 | 501 | 274 | 170 |
| 1914 | 7,040 | 277 | 639 | 480 |

sions. I am of the opinion that guessing is by no means confined to the above kinds of certificates, but accompanies other sources of error mentioned above and now to be considered. Table 1 gives the gross results of the examination of death certificates at their face value, comparing the year 1914 with the year 1894, to show what progress, if any, has been made.

TABLE 2.—CONTRADICTIONS NOTED IN VARIOUS DEATH CERTIFICATES

| Cause | Contributory Condition | Comment |
|---|---|---|
| Uremic poisoning (duration twenty days) | Albuminuria (duration three days) | |
| Pernicious anemia (duration three months) laborer, 43 yrs. old | ..... | Physician attended one day |
| Dilatation of heart (duration, one year) | ..... | Physician attended one day |
| Acute yellow atrophy (adult) | ..... | Duration seven months |
| Acute nephritis | ..... | Duration one year |
| Chronic endocarditis | ..... | Duration fifteen years |
| Gastro-enteric catarrh (duration two mos.) | Influenza (duration fifteen days) | Woman, aged 22 |
| Graves' disease | Ptomain poisoning and valvular heart disease | Believe contributory, here were signs of cause |
| Asthma of lungs | Laborious work | Emphysema? |
| Chronic bronchitis (duration one year) | Pulmonary hemorrhage | Tuberculosis? |
| Hypertrophic cirrhosis of the liver (man aged 56) | Valvular heart disease, mitral (duration one year) | Chronic passive congestion? |

Consideration in detail of the headings, with examples given, will make clear the kind of certification it is intended to criticize or question. Table 2 shows examples from certificates (year 1914) containing various contradictions. Duration is inconsistent with disease or patient with disease, and in some few cases I know that the cause of death as stated was probably incorrect. Statements not essential to the point are omitted.

Examples of certificates improperly made out, for example, with transposed or conflicting causes or with a multiplicity of nonessential causes are given in Table 3. Remember that the registrar can send to the census

TABLE 3.—EXAMPLES OF IMPROPERLY GIVEN CAUSES OF DEATH

| Primary or Statistical Cause | Contributory Conditions |
|---|---|
| Aortic stenosis, aortic insufficiency, mitral stenosis, nephritis, ulcerative colon. | Cardiac dilatation, uremia. |
| Bronchopneumonia, heart disease — mitral, progressive muscular atrophy. | Hemiplegia. |
| Acute appendicitis, appendix abscess, subperitoneal abscess, volvulus. | Plastic peritonitis, acute suppurative peritonitis. |
| Alcohol poisoning and heart failure from overstimulation from alcohol. Patient had been drinking very heavily for last three weeks. | When not under alcohol patient was in good health. |

but one cause of death per death, and consider these causes. Some of these examples come from the best equipped men in the city and from hospitals. They were transcribed without alteration.

A common practice is to transpose, that is, give the contributory condition for the primary cause of death, and vice versa. This error does not affect a diagnosis which in itself may be correct, but if, for instance, an adequate contributory condition is put down in place of an adequate primary cause and the two causes contributory and primary are transposed, the registrar may be justified in reporting for the census a contributory cause which is in fact erroneous. Many physicians are not yet clear on what is a primary and what a contributory cause. This is not always easy to state, but granted the distinction can be made, the primary is the statistical cause of death, namely, that which goes through to the census reports. With this in mind the diagnostician cannot write "starvation" in the space where "cancer of the esophagus" ought to be.

Words added to certificates which serve no useful purpose but only confuse are the usual terms deprecated in the physician's pocket reference of the international list of causes of death, such as: marasmus,

TABLE 4.—EXAMPLES OF TRANSPOSITION

| Cause | Contributory Condition |
|---|---|
| Inanition-myocarditis | Cancer of the esophagus |
| Toxemia | Pulmonary tuberculosis |
| Edema of lungs | Cerebral syphilis |
| Bronchial pneumonia | Pertussis |
| Brain pressure | Cerebellar tumor |

exhaustion, asthenia, cachexia, inanition, general weakness, dentition, and so on. They usually signify uncertainty. Those certificates, otherwise correct, which use these terms of infants especially in prematurity, have not been considered, as they appear so frequently.

Examples of conflicting diagnoses may be given. When two or more separate adequate causes of death occur simultaneously in the same patient, as said before, only one may be chosen by the registrar. The insane asylums, for example, are a fruitful source of

such conflict, for in most cases where insane patients die of a well-marked psychosis other important causes give way. The following examples were all taken from certificates.

| | | | |
|---|---|---|---|
| Tuberculosis | Epilepsy | Scarlatina | Cancer |
| Dementia praecox | Nephritis | Diphtheria | General paresis |
| Nephritis | | | |
| Diabetes | Intestinal obstruction | | |
| Syphilis | Pertussis | | |

The overshadowing disease, usually that of longest duration, becomes the cause of death. The difficulty presents itself peculiarly well in the coincidence of intestinal obstruction and pertussis. Intestinal obstruction in this case considered clinically would, as the predominating cause of death, take precedence over pertussis. Statistically, however, it is vastly more important to the community to know that there has been another death from pertussis, and the case would probably be so recorded.

Now take the year 1894. Under doubtful causes, be it noted that many more certificates were doubted than in 1914, in the first place because certificates were accepted then that would now be sent back for correction. In most returned and corrected certificates of 1914 there is reason to presume that the diagnosis was not thereby rendered more correct, but simply more in outward conformity with the international list of causes. On the other hand, many oft-repeated diagnoses of 1894 reflect by contrast the advance in medical knowledge during twenty years. Typhoid pneumonia was still a common expression, usually meaning a rapidly fatal pneumonia accompanied by a condition of shock. Various "congestions" of brain, liver, lung, etc., were still in vogue. "Membranous croup" was accepted, though it was grouped with diphtheria in the final accounting; similarly "enteric fever" with typhoid. Some typical examples of doubtful diagnoses, written in 1894, may be noted.

TABLE 5.—EXAMPLES OF DOUBTFUL DIAGNOSES

| Cause | Contributory Condition | Remarks |
|---|---|---|
| Typhoid fever (woman, aged 79) | ..... | Duration seven days |
| Typhoid fever (child, aged 5) | ..... | Duration two days |
| Apoplectic stroke..... | Abscess of brain..... | Child 3 years old |
| Neuralgia of heart.... | ..... | Child 6 years old |
| Chlorosis ..... | ..... | Negress, aged 19 |
| Severe nervous deviation due to changes of puberty | ..... | Girl, aged 14 |

An interesting example is the following diagnosis after necropsy in which the cause would today doubtless have been ascribed to a stone in the ampulla of Vater.

| Cause | Contributory Condition | Remarks |
|---|---|---|
| Hepatitis, perihepatitis, cholecystitis, enteritis (small intestine) (localized peritonitis), pancreatitis, pancreatic hemorrhage | Gastralgia and vomiting, collapse from shock | Woman, aged 62. Necropsy performed |

There were instances in both years when the physician expressed on the certificate doubt of his own diagnosis. And yet, perforce, no such doubt was expressed in the census unless the case was classified among the "doubtful causes," which was not done unless the cause given was in itself doubtful. As may be supposed, the average faulty diagnoses were much more obviously and frequently incorrect in 1894 than in 1914. Conflicting causes, on the other hand, were far less frequent in 1894. The reason for this is to be found in an off-hand certainty which pervaded these earlier documents. Usually no duration was given. A physician took his duty much more lightly and the certificates were generally made out with far less care. As to improper certificates, the great increase in their number in 1914 was due to the overanxiety to be correct. The certifying physician nowadays feels that one cause may not stand alone, it must be plentifully characterized and fortified with contributory features which would make the dénouement appear inevitable, in order to avoid any dispute with the registrar. It is now, therefore, more often than ever the task of the registrar to choose from a number of causes that which seems the most likely.

Now taking only such as show striking differences, let us compare some given diseases in frequency of diagnosis. This with the idea of gaining an impression, more cannot be proved, whether diagnosis is in all things vastly better or whether it is so of certain diseases only while other increases or losses come of insistence that the certificate shall look more truthful whether it be so or not.

TABLE 6.—INCREASED OCCURRENCE OF DISEASE AS SHOWN IN DIAGNOSIS

| Syphilis | 1894 | 1914 |
|---|---|---|
| Adult ..... | 12 | 32 |
| Congenital ..... | 14 | 88 |
| Congenital (subdivided) | | |
| † In X, infant asylum..... | 1 | 54 |
| † In rest of city..... | 13 | 34 |

In Table 6 the first and last line of figures might represent the normal increase proportionate to population. The second and third lines, however, show an enormous increase, and this is found to be due to a great number of diagnoses coming from one institution, probably indicating better diagnoses in that institution, whereas much infantile syphilis occurring elsewhere is lost under other headings.

Table 7 indicates a striking increase in a more definite as against a sharp decrease in a less definite diagnosis of the same character. This change is presumably one of the effects of insistence on more definite terminology.

TABLE 7.—INCREASE DUE TO MORE DEFINITE DIAGNOSES

| | 1894 | 1914 |
|---|---|---|
| Apoplexy ..... | 112 | 216 |
| Paralyses (not paresis)..... | 57 | 21 |

A search was made for instances of an increase, due with the least possible doubt to improved knowledge. The first column in Table 8 gives the actual number of certified deaths of 1894 due to the disease chosen, then the number of cases interpreted from certificates of the same year as probably due to the disease, but otherwise stated. In the last column are the official totals for 1914. The "possibles" for 1914 were insignificant in number.

Note in Table 8 that in 1 and 2 the first two figures added give an approximately normal increase. In 3 the excess increase may be partly accounted for by

TABLE 8.—INCREASE DUE TO IMPROVED DIAGNOSES

| | 1894 Actual | 1894 Possible | 1914 |
|---|---|---|---|
| 1. Appendicitis | 15 | 25 | 77 |
| 2. Prostatic disease (not cancer) | 4 | 11 | 22 |
| 3. Exophthalmic goiter | 0 | 2 | 17 |
| 4. Leukemia | 2 | 0 | 13 |

postoperative deaths. In 4 the signs could not be read into a death certificate, being dependent on a blood count.

Table 9 gives a comparison showing changes due in part to suppression of the really justifiable diagnosis of "old age." This term may be a refuge of ignorance or one under which to group the aged dead when time or opportunity is lacking to make out more definitely the terminal disease. Many physicians who would formerly have written "old age," "heart failure," "gastritis," "exhaustion," "dropsy," or what not, will now write arteriosclerosis, myocarditis, or nephritis, either together or separately and probably in many cases by reason of circumstances previously enumerated get no nearer the truth.

Table 10 shows that the disproportionate increase in violent deaths was due to insistence on supervision by a medical examiner in all cases in which there was history of trauma leading to the terminal illness, whether or not death was the immediate outcome.

The diagnosis, chronic nephritis, as indicated in Table 11, is increased not alone by any marked change

TABLE 9.—COMPARISON SHOWING DROP IN REPORTED CAUSE OF DEATH AS DUE TO "OLD AGE"

| | 1894 | 1914 |
|---|---|---|
| Arteriosclerosis | 1 | 392 |
| Old age | 189 | 44 |

in prevalence of the disease, but partly by the fact that in a certain number of old people it constituted the "last straw" or terminal breakdown. To mix such deaths with those of children or adults taken out of vigorous life by Bright's disease is confusion. In the case of senile persons with a late nephritis, it had better have been set down that they died of senility than to have added the terminal disabling of any given organ to the category of important causes of death. Hence, to compare today's death rate for chronic nephritis with that of twenty years ago, without due regard for change in the character of certification, is fatuous.

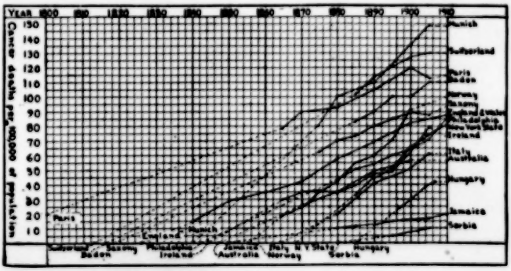


Fig. 1.—Cancer deaths per hundred thousand of population.

It is therefore incorrect to expect from the decrease in the diagnosis "old age" the chief source for the increase in cancer.

A similar source of error exists at the other extreme of life. As in senility old age is the important factor, so here it is infancy itself. From the clinician's point of view it was all important that the dead infant was fed on pickles and coffee. From the statistician's point of view the important factor was the infancy, because later in life pickles and coffee have little or no particu-

TABLE 10.—INFLUENCE ON REPORTS OF SUPERVISION BY MEDICAL EXAMINER

| | 1894 | 1914 |
|---|---|---|
| Certificates made by official diagnostician or medical examiner | 140 | 1,111 |
| Total violence | 240 | 444 |
| Trauma due to fall | 18 | 100 |

lar etiologic significance. Wherefore infantile malnutrition and malassimilation, as the case may be, should have just the same repute in a statistical diagnosis as senility. In such cases the clinician should not be made to feel forced, in the face of a clinical uncertainty, to find a point in the respiratory, circulatory or gastro-intestinal tract on which to hang his diagnosis. For these reasons the mortality figures of forms of death common in infancy, save still birth and the contagious diseases, are of little value in establishing the death rate for any given disease.

Now to my main purpose, namely, to consider the cancer diagnosis as a diagnosis, and how it may be affected by factors other than the true or actual death rate for cancer. To begin with, there is no doubt that, whatever the cause, the cancer death rate curve shows throughout the world a steadfast and rapid rise unlike that due to any other cause, save, in a minor degree, diabetes. Figure 1 will show this graphically. This chart will also indicate certain startling conclusions.

If the death curves run upward at the present rate, in a short time, say another generation, cancer will far

TABLE 11.—APPARENT INCREASE IN DEATHS FROM NEPHRITIS AND DISEASES OF CIRCULATORY SYSTEM

| | 1894 | 1914 |
|---|---|---|
| Arteriosclerosis | 1 | 392 |
| Myocarditis, fatty heart and cardiac paralysis (in persons over 60) | 30 | * |
| Nephritis, chronic (in persons over 60) | 45 | 250 |
| Total circulatory | 344 | 1,117 |

* Now included under organic diseases of heart.

outstrip other causes of death in persons of the cancer age. That this forecast is fallacious can be demonstrated with equal propriety by reversing the process, running the curve backward, as is done in the chart

by means of dotted lines. The cast backward at the same average rate will seem to show that previous to 1800 there was practically no cancer worthy of mention anywhere on earth, and that our own state of New York had less than 1 cancer death per 100,000 of population previous to 1865. This would give for that year about 40 deaths for the state, due to cancer! The only country showing a sharp deviation from this curiously steady upward slant is Ireland, which difference may be explained by the obvious reason of the unparalleled depletion in a short time of its adult population by emigration. Another striking diagram is that giving four causes of death for the state from 1885 to 1912, inclusive (Fig. 2).

"Old age" is a diagnosis which has been during this given period sharply on the decline, not because of any sharp decrease in the relative incidence of old age, but almost wholly because of suppression of the term in the interest of supposedly greater accuracy of statistics.

"Diphtheria" is a diagnosis which has dropped *pari passu* with "old age," for an entirely different reason, namely, because of an actual decline in the number of deaths due to this disease in the face of methods of diagnosis which have shown it to be far more widespread than was formerly supposed. In 1894 there were made in the whole year at Buffalo 147 bacteriologic examinations for diphtheria; in 1914 as many every three days.

Diagnoses of malaria diminished, due both to improvement in diagnosis and in the incidence of the disease, certainly more by the first than by the second reason. In other words, examination of the blood has done more to diminish deaths due to this disease in New York by proving its rarity than has the extermination of the mosquito, though there was undoubtedly more of it in the state at one time than at present. So far as is known it was always the tertian form, a variety not serious in itself and most easily controlled by quinin. Fatal cases that occur in this state nowadays can be only in patients brought up from the tropics to die. Death due to locally acquired malaria belongs to the anomalies and curiosities of medicine.

Cancer is still in doubt.

It is a strange coincidence that the diphtheria and old age curves should be so alike, though produced by such fundamentally different causes. It appears, therefore, that two diseases may seem to diminish in a parallel from wholly different causes. It follows that the increasing curve of cancer may be due to any one or a variety of causes.

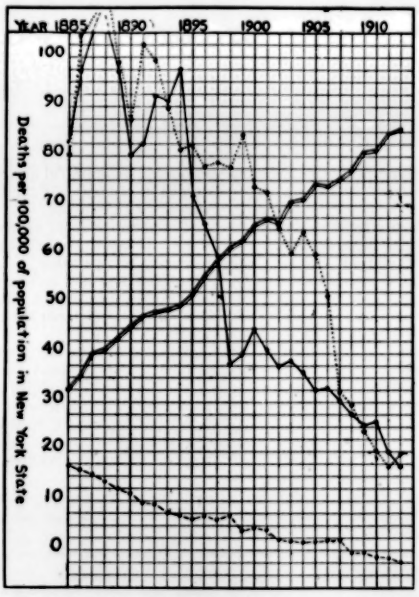


Fig. 2.—Deaths per hundred thousand of population in New York State: double line, cancer; dotted line, old age; solid line, diphtheria; line of dashes, malaria.

In general, cancer, as indicated by malaria, old age and diphtheria, may increase from four causes: (1) forcing the diagnosis to avoid controversy or as result of popular or professional cancer campaigns; (2) improved diagnosis and more frequent disclosure of the disease; (3) actual increase in the incidence of the disease; (4) age and sex constitution, reference to which is omitted as outside of the scope of this article. According to Table 12 let us consider what a comparison of cancer death certificates in Buffalo in 1894 and 1914 might indicate.

The cancer increase is certainly not due to an exchange with old age because, as shown previously, old age has become scattered under various headings, principally arteriosclerosis, organic heart disease, and nephritis. It is probably not due alone to forcing, because a doubtful condition in a person of the cancer age may be given any one of several names conforming with terminal symptoms. The figures, however, appear to countenance the idea that a considerable part of the increase is due to forced diagnosis. This is hinted at by the decided increase over the natural growth of population in the number of doubtful cancer certifi-

TABLE 12.—APPARENT INCREASE IN DEATHS FROM CANCER

| | 1894 | | 1914 | |
|---|---|---|---|---|
| | Total | Ratio | Total | Ratio |
| Population | 300,000 | 1. | 434,122 | 1.5 |
| Total deaths | 5,280 | 1. | 7,040 | 1.25 |
| Total cancer deaths | 164 | 1. | 428 | 2.6 |
| External cancer | 39 | 1. | 82 | 2.1 |
| Internal cancer | 125 | 1. | 346 | 2.77 |
| Certified cancer, was probably not | 13 | 1. | 36 | 2.77 |
| Certified something else; was probably cancer | 40 | 1. | 58 | 1.45 |

cates, that is as 13:36, or 1:2.77, which approximates the increase for internal cancer. Furthermore, certificates not for cancer, but which might on their face value have been cancer (1:1.45) take a place between the increase of population (1:1.5) and that of the total deaths (1:1.25). Examples of certificates giving cancer as cause of death which seemed likely not to have been cancer at all are given in Table 13.

TABLE 13.—EXAMPLES OF POSSIBLE ERRONEOUS DIAGNOSIS OF CANCER

| | Cause | Contributory Condition | Remarks |
|---|---|---|---|
| 1894 | Intestinal cancer, woman aged 38..... | ..... | Duration four yrs. No hint of operation or necropsy* |
| | Cancer of stomach, man aged 64..... | ..... | Duration one and one-half yrs. No necropsy or operation. Attended for two weeks |
| 1914 | Cancer of intestines, boy aged 10..... | ..... | No operation or necropsy noted |
| | Infection of gallbladder, chronic ulceration of intestines, malignant degeneration head of colon with obstruction | Chronic malarial toxemia dysentery..... | Man, aged 36. No operation or necropsy recorded |

* Death in a hospital was taken as presumptive evidence of a correct diagnosis.

In Table 14 are examples of certificates giving some cause of death not cancer, which it seemed might easily have been cancer.

Improved diagnosis as a factor in the increase is indicated by a markedly greater increase under the head "internal" as opposed to "external" cancer. The dividing line between external and internal cancer was arbitrarily made, by including as external those cancers which might have been discovered by the patient as distinguished from those discoverable as a rule only by complex methods, operations or necropsy. The increase in the population is represented by the figures 1:1.5, the increase in external cancer by the figures 1:2.1, and the increase in internal cancer by the figures 1:2.77.

Actual increase in cancer, if any, must therefore share the statistical increase with the two other causes of increase. The numerical importance of these two other causes cannot be accurately determined by any such crude methods as the inspection of death certificates, but their influence is indicated not only by the figures quoted before, but also by impressions gathered from their perusal. These impressions cannot be set down in type, as they are derived from acquaintance with the certifying physician, or the death to which he has certified.

The studies of Cabot and others referred to in the beginning indicate substantial errors in general conclusions based on a large increase in cancer. However, they go no further than that we are not justified in taking the figures at their face value, but must allow for a margin of error of from 10 to 90 per cent. according to the difficulty of the case. This paper serves to emphasize that over and above diagnostic differences and errors, the limits of accuracy are still broader and more uncertain when the death certificate, even with due reference to age conditions, is called on to prove anything. These considerations led me to the following conclusions:

1. The majority of all deaths take place under circumstances that make accurate diagnosis improbable or impossible, wherefore death certificates are, in the majority, of doubtful accuracy. The sources of error are of a nature that tends to increase the apparent cancer death rate.

2. Deaths certified as due to (a) contagious or epidemic diseases, (b) violence, (c) causes verified by necropsy or operation, may be set down as the most comprehensive and accurate: all other causes are proportionately subject to inflation or diminution due to influences apart from the actual incidence of a given disease.

3. To give more accurate results within the limitations of error, the final classification of disease for the census should be modified by further study. To separate conclusive from fallacious causes there should be a large place (a) for deaths, of themselves uncertain in character, for example, nonviolent deaths certified by medical examiners without previous observation; (b) for all deaths of infants under 2 years of age and of old persons over 70 years of age in whom infantile debility or senility is a predominant condition; (c) all unknown causes should be frankly certified as unknown, for example, as cerebral, thoracic or abdominal unknown. Certificates of this kind would be naturally diminished in time by improved knowledge and should not be curtailed or abolished by arbitrary insistence on the giving of a "satisfactory" cause.

TABLE 14.—PROBABLE DEATHS FROM CANCER NOT SO REPORTED

| | Cause | Contributory Condition | Remarks |
|---|---|---|---|
| 1894 | Marasmus, malnutrition (duration four months) | Metritis, inflammation of stomach and esophagus | Woman, aged 44 |
| | Inanition | Stricture of pylorus peptic ulcer..... | Man, aged 50 |
| 1914 | Influenza, myocardial degeneration and dilation | Stricture of the esophagus, marasmus (two years' duration) | Man, aged 62 |
| | Pernicious anemia (duration six months) | Rectal hemorrhage (duration one month) | Woman, aged 54 |

4. Death rates for disease can be made accurate only by universal necropsy. As a preliminary measure to introduce universal necropsy the law, as regards necropsy, should be made permissive, in order that a necropsy might be performed save when the deceased or nearest relative expressly prohibits it. This measure would tend gradually to break down useless prejudice partly sustained by the present law, which pro-

vides that the nearest of kin shall expressly and in writing consign the deceased to the diagnostic dissecting table. Necropsy should be a privilege of humanity for the living, not a penalty of the notable or notorious dead.[6]

5. If there is anything to be gained by the study of cancer statistics of this country in their present condition as regards cancer increase, it is rather in figures from small well-ordered communities over many years, where the figures may be controlled on the spot, than in taking broadly summarized figures of the general census for cities, counties and states.

113 High Street.

## SUPERNUMERARY KIDNEY

HERMAN LOUIS KRETSCHMER, M.D.
Urologist to Presbyterian Hospital; Genito-Urinary Surgeon to Alexian Brothers Hospital
CHICAGO

Cases of true supernumerary kidney may be considered one of the rarest of all pathologic renal conditions. A very interesting and brief reference to this subject was given by Voigtel[1] in 1805. He mentions cases reported by Blassius, Cruveilhier, Dupuytren, Eustachius, Gavard, Hyrtl and Haller. Voigtel, who reported the presence of four kidneys, also mentions a few writers, namely, Bottalus, Dellstang, Gemma and Schenk, who reported the presence of four kidneys.

The occurrence of accessory kidneys is not limited to man. Von Hansemann[2] found an accessory kidney in a pig, and Pieth[3] demonstrated the presence of a third kidney in a cow. This kidney was separate from the two ordinary kidneys, which were normal in position and structure.

Supernumerary kidney must be differentiated from cases of double kidneys. This form of anomaly is also very rare, but it is found more frequently than are cases of accessory kidneys, so that one may consider the latter as being relatively more common than the former. Failure clearly to differentiate between these two conditions is apt to occur when part of the double kidney has undergone some pathologic change. This oversight has occurred in some of the publications in which cases of undoubted double kidney are reported as supernumerary kidney. Suter,[4] in a recent article on this subject, tabulates nineteen cases. Several of these are not above reproach and undoubtedly should be reported as cases of double kidney. It may be questioned whether both of Suter's cases should be considered as true supernumerary kidneys.

I wish to report the following case:

Mrs. W., aged 27, complained of recurring attacks of kidney-stone colic. The present illness began two years ago, at which time the patient had her first seizure. This began very suddenly with a severe pain in the left kidney region, which lasted several hours, and was preceded by a chill and fever. Three weeks later she had another attack, and these have since recurred about every three weeks, usually persisting for a day; one lasted three days. During the first attacks she did not observe the urine, but later, after each attack, the patient always found stones, and the urine was tinged with blood.

During the last month or two, she states, her urine was very turbid. The attacks were always associated with nausea and vomiting. There was some frequency of urination, the patient being obliged to void every two hours during the day, and several times during the night. There was more or less pain and burning on urination. There is no history of previous illnesses. Menstruation is regular, of the twenty-four day type. The bowels show a tendency to constipation since the onset of her illness.

*Physical Examination.*—The patient is a well-developed, well-nourished woman. The pupils react to light and accommodation. The thyroid gland is enlarged, both lateral lobes and isthmus; there are no symptoms of Graves' disease.

The recti muscles are slightly separated. The left kidney is palpable. Deep pressure over the right kidney causes pain and muscular spasm, the tenderness being more marked posteriorly.

Examination of the thorax was negative as regards heart and lungs. The examination of the extremities was also negative in result.

*Cystoscopic Examination.*—June 8, 1914: Bladder negative except for the presence of small adherent whitish flakes of mucopus. A small polyp was seen on the internal urethral orifice. Double ureteral catheterization was easy.

Supernumerary kidney which contained thirteen stones. This kidney was not attached to either of the other two kidneys, and had its own blood supply.

URINARY ANALYSIS

Right Kidney

| | |
|---|---|
| Appearance | Clear |
| Albumin | Trace |
| Sugar | 0 |
| Microscopic Examination | Negative |
| Cultures | Sterile |

Left Kidney

| | |
|---|---|
| Appearance | Turbid with flakes of pus |
| Albumin | +1 |
| Sugar | 0 |
| Microscopic examination | Pus in large amount |
| Cultures | Sterile |

Result of Phenolsulphonephthalein Test, Intravenous Administration, Thirty Minutes' Collection

| | Right Kidney | Left Kidney |
|---|---|---|
| First fifteen minutes | 17.5 per cent. | 11 per cent. |
| Second 15 minutes | 9 per cent. | 8 per cent. |
| | 26.5 per cent. | 19 per cent. |

Total output for thirty minutes, 45.5 per cent.

The blood examination showed leukocytes 7,900; hemoglobin (Dare) 73 per cent.; blood pressure 146.

*Roentgen-Ray Examination.*—In the region of the left kidney there were seen many more or less indistinct shadows. These shadows were very faint. The roentgenogram did not resemble that usually seen in cases of kidney stone. Because of these peculiar findings a possible diagnosis of incrustations of the renal pelvis was made.

It was decided to perform a pyelotomy and to curet the areas of incrustations and remove any calculi that might be present.

*Operation.*—June 10, 1914: The usual oblique incision was made. The kidney was exposed without any difficulty but it could not be delivered because of the extremely short pedicle. Numerous stones were palpated in the pelvis. Small depressed scars were seen on the surface. Pyelotomy could not be carried out because it was impossible to bring the kidney up far enough to expose the pelvis. After careful deliberation it was decided to remove the kidney, which

6. Wilson, L. B.: The Necropsy as a Public Service, THE JOURNAL A. M. A., May 8, 1915, p. 1563.
1. Voigtel: Handb. d. path. Anat., 1805, p. 169.
2. Von Hansemann: Berl. klin. Wchnschr., 1897, p. 81.
3. Pieth: Jahresb. f. Urol., 1909, p. 419.
4. Suter: Folia urol., August, 1913.

was full of stones. The kidney, except that it was small, did not differ in appearance from any other kidney.

The wound area was thoroughly exposed with retractors before closing and a dark mass was seen in the depths of the wound. I attempted to remove this with my finger, thinking it was a blood clot. This small mass had a pedicle which was clamped, tied and cut. It proved to be a supernumerary kidney, which also was full of stones. This kidney had its own pelvis and its own blood supply. (See illustration.)

*Cystoscopic Examination.*—July 6, 1914: The bladder still shows a slight degree of cystitis. Both right and left ureters were negative. Only one ureteral orifice was seen on the left side. Examination of the urine still showed the presence of pus. This postoperative cystoscopic examination was made especially to determine whether or not there were three ureteral openings in the bladder.

From a careful study of the recorded cases, it is quite apparent that one of the greatest difficulties arises in making an accurate preoperative diagnosis. Calabrese[5] made a probable preoperative diagnosis of supernumerary kidney in his case, by palpation. Palpation is necessarily of limited value; and a positive diagnosis made from this alone seems to be quite an assumption. The presence of three ureteral orifices in the bladder is only of partial help, as this is not pathognomonic. Three ureteral orifices may be seen cystoscopically in cases of double ureter and double pelvis. As a matter of fact this aid was absent in the cases of Rustschinski,[6] von Hansemann, the case mentioned in the U. S. Marine Hospital reports,[7] Calabrese, Tonkow, and Isaya,[8] in which only two ureteral orifices were found in the bladder, the two ureters of the same side having fused outside of the bladder. This was exactly the condition in my case, the ureter from the accessory kidney fused with the ureter of the normal kidney on the same side, outside the bladder (see postoperative cystoscopy). Barlett[9] reported three ureteral openings in the bladder and Wedensky's[10] case was unique in that the ureter of the accessory kidney terminated in the prostatic urethra. So far as I know this is the only case in which the ureter of a supernumerary kidney so terminated.

It seems as though the diagnosis might be made in suspected cases by means of pyelography. Inasmuch as we know of the tendency of these ureters to unite outside the bladder, the ureteral catheters might be inserted only a few inches into each ureter and then the solution be allowed to find its way into each renal pelvis. The presence of three separate and distinct pelves in the roentgenogram might aid in establishing the diagnosis. (?)

It is perfectly obvious that the shadowgraph catheter would be of doubtful value in establishing a diagnosis in this group of cases.

The rare occurrence of this condition, the scarcity of case reports, and the lack of detail in reporting the cases, leaves much to be desired in our knowledge on this subject.

There was nothing in the history, cystoscopic examination or Roentgen-ray findings in this case to cause us to suspect the presence of this rare anomaly.

Of interest is the fact that, in four cases, this condition was found on the right side (Watson Cheyne,[11] Isaya, Tonkow and Wedensky). In eleven cases the condition was found on the left side (Barlett, Cobb and Giddings,[12] Calabrese, von Hansemann, Hyrtl,[13] Munro and Goddard,[14] Mills,[15] Newman,[16] U. S. Marine Hospital Service Reports, Rustschinski, and my case).

The kidney, in Mills' case, was discovered in the dissecting room. The cases reported by Wedensky, Rustschinski, von Hansemann, Bartlett and Newman are given in necropsy reports. Clinical cases were reported by Cobb and Giddings, Calabrese, Depage,[17] Isaya, Munro and Goddard, and Watson Cheyne.

Many of the cases reported do not contain definite statements regarding the pathologic condition which existed in the supernumerary kidney; the statement is simply made that an accessory kidney was found. My case is the only one in which calculi were reported present. It is, furthermore, the only one in which two of the three kidneys were the seat of the disease.

In Rustschinski's case, all three kidneys were the seat of foci of suppuration, and it is apparently the only case in which all three kidneys were diseased. In the remaining cases the pathologic conditions mentioned as found in the supernumerary kidney were: cystic changes (Wedensky), rudimentary pelvis (Mills), papillary cystadenoma (Cobb and Giddings), movable kidney (Watson Cheyne), pyelonephrosis (Munro and Goddard).

122 South Michigan Boulevard.

5. Calabrese: Ann. d. mal. d. org. génito-urin., 1908, ii, 1841.
6. Rustschinski: Quoted by Suter, Folia urol., August, 1913.
7. Rep. U. S. Marine Hosp. Service, 1885.
8. Isaya: Ann. d. mal. d. org. génito-urin., 1911, p. 225.
9. Barlett: Lancet, London, Jan. 9, 1904.
10. Wedensky: Folia urol., October, 1911.
11. Watson Cheyne: Lancet, London 1899, p. 218.
12. Cobb and Giddings: Ann. Surg., 1911, liii, 367.
13. Hyrtl: Quoted from Reinfelder, Inaug. Diss., Munich, 1905.
14. Munro and Goddard: Am. Jour. Med. Sc., 1907, p. 398.
15. Mills: Jour. Anat. and Physiol., 1911-1912, xlvi; ibid., xlvii, 313.
16. Newman: Tr. Clin. Soc., 1898, xxxi, 131.
17. Depage: Jour. de méd. et de chir. de Bruxelles, 1893.

## ACUTE ASCENDING HEMORRHAGIC MYELITIS *

BENJAMIN T. BURLEY, M.D.
Visiting Neurologist, Memorial Hospital and Worcester City Hospital
WORCESTER, MASS.

The title of this article is descriptive of a rare pathologic condition which has comparatively recently come under my observation. Its rarity is attested by the fact that in the literature very few cases can be discovered of this combination of acute inflammation of the spinal cord with overwhelming diffuse hemorrhages into the gray matter, and to somewhat less extent into the white matter.

It seems important to draw an analogy between this case and two other cases of acute ascending paralysis, also recently under observation.

The evidence tends to show that there are three clinical as well as pathologic types of acute ascending paralysis. My conception of the differentiation of the three will follow later.

In order to have the material before us, I shall at once describe this case of acute hemorrhagic myelitis, and later briefly the other two cases.

Case 1.—E. W., a girl of 20, about to graduate from a private school, gave the following history: Her parents are living and well. There are two other children, one well and the other nervous. No family disease is known.

* Read before the Section on Nervous and Mental Diseases at the Sixty-Sixth Annual Session of the American Medical Association, San Francisco, June, 1915.

* On account of lack of space this paper has been abbreviated for THE JOURNAL. It will appear in full in the Transactions of the Section and in the author's reprints.

The patient was a "blue baby," and the blueness persisted throughout her life. She had been rather delicate, of a nervous type and had had to favor herself more than a normal child. She had done well in school, however, and up to five days ago appeared to be in her normal health. Five days ago she first noticed a numbness, accompanied by some weakness, in her left foot. The following day a similar condition arose in the right foot, and later this numbness and paralysis gradually crept up her body, so that on the third day the numbness extended as far as the chest and began to attack the left arm.

She was brought home at this time, and was attended by two physicians, who were undecided whether she was suffering from hysteria or from some spinal cord lesion.

On the next day she had for several hours very severe pains, starting apparently in the spinal region and extending down both legs, especially the left. About this time also, her right arm became involved, the neck became somewhat stiff and she was practically completely paralyzed, except for her head, though certain weak movements of the right hand were possible.

At this time, that is, on the fifth day, I saw her in consultation with Dr. Kendall Emerson, and made the diagnosis of acute ascending paralysis. The temperature at this time was 103. The whole body was a grayish blue. The finger tips were markedly clubbed. There was practically complete anesthesia and muscular paralysis below the neck. The patient was unable to control the bladder and rectum. On the left leg was a large burn, 6 inches across, of which she was not aware, produced the night before by a hot water bottle. The pupils were equal and reacted normally to light. The neck was only slightly rigid. The tongue was dry and coated. The heart was rapid, 120, but not markedly enlarged and no murmurs were heard. The patient was conscious and perfectly clear mentally. The speech was unaffected. The respiratory muscles were just becoming affected, deep respiration absent. No glands were palpable.

Fig. 1.—Case 1, E. W. Cord showing large area of hemorrhage in posterior horn.

I ordered immediate removal to Memorial Hospital, after first doing a lumbar puncture and withdrawing 15 c.c. of a somewhat turbid and markedly blood-stained fluid. The pressure of the fluid was somewhat above normal. The blood stain was evidently not due to trauma by the puncture, as all the fluid withdrawn was of the same nature. Subsequent examination of this fluid showed a marked excess of blood cells, an enormous excess of polynuclear white cells, some of them more or less disintegrated, and no bacteria. Cultures were taken from the fluid but no organisms could be grown. The globulin reaction was positive.

At the hospital the patient was made as comfortable as possible. She had no pain, but felt as if her body was heavy and she had an increasing sense of exhaustion. She was put on liquids and hexamethylenamin, 20 grains, every four hours.

Her entrance to the hospital was at 8 p. m., May 25, 1914. At that time her white blood count was 12,300; hemoglobin 80 per cent.

She did not sleep well that night on account of inability to move and a sense of weakness. Toward morning the respiration became more shallow and cyanosis increased. Suddenly at 9:45 a. m. respiration stopped practically without warning. A few moments later the heart beats ceased.

Permission was given for necropsy, which was performed by Dr. Kinnicutt at 1:30 p. m.

*Anatomic Data.*—Body of a well-developed young woman, markedly cyanosed.

Head: On section of the scalp there is a large amount of dark fluid blood. On removal of the skull-cap the longitudinal sinus is distended with dark fluid blood. The dura is not adherent, the meningeal vessels are injected, and the convolutions are somewhat flattened. On section of the brain: The ventricles contain no excess of fluid, but throughout the cerebral cortex are scattered numerous minute hemorrhagic areas.

Spinal Cord: The sections throughout its length show extensive areas of hemorrhage within the cord, especially into the gray matter, often entirely replacing the normal markings. There is no excess of spinal fluid and no evident induration around the meningeal covering.

Body: On section the subcutaneous fat is considerable in amount. The peritoneum is smooth and glistening. The appendix is normal. The lower border of the liver in the right mammary line is at the costal margin. The pleural cavities contain no free fluid. The lungs are salmon red in color and on section yield a large amount of pale, frothy fluid. The pericardium is normal. The heart is somewhat enlarged. On section the left ventricle wall is thickened. The papillary muscles are hypertrophied. The valves are normal. The foramen ovale is patent. The liver on section yields a large amount of dark fluid blood and shows "nutmeg" markings. The spleen is enlarged, firm, dark purple in color and on section yields a large amount of dark fluid blood. There is a small accessory spleen at its lower pole. The kidneys are enlarged. The capsules peel easily, leaving smooth surfaces. The abdominal organs otherwise are not remarkable.

Sections of the brain and spinal cord are placed in alcohol or 10 per cent. dilution of liquor formaldehydi for further examination. The bulk of the spinal cord is put into sterile glycerin for shipment to the Rockefeller Institute for Medical Research.

*Microscopic Examination of the Brain and Cord: Paraffin Cresyl Violet Sections.*—Cortex: Section 1: Precentral. The pia is of normal thickness. It contains small numbers of lymphocytes and numerous large endothelial cells, many of which are laden with blood pigment. Cortical lamination is normal and the nerve cells stain well. A mild satellite reaction is present in the deeper layers. Small amounts of green pigment are seen about some of the cortical capillaries, but otherwise the vessels are normal.

Cord: Section 1: About second segment (Fig. 1). Macroscopically, a large area of hemorrhage is seen, occupying the anterior and posterior horns of one side and extending anterolaterally to the periphery. Microscopically, there is found a disruption of the nerve tissue in the hemorrhagic area and a marked edema of that side of the cord. Smaller hemorrhages are scattered about the large focus. The reaction of the nerve cells varies. An occasional one is shrunken and angular, but the majority stain well, even those situated in the hemorrhagic area. There is no undue satellitosis. A

heavy perivascular infiltrate of lymphocytes, together with a few polymorphonuclear leukocytes, is present. No plasma cells are seen. The vascular endothelium is not remarkable. Numerous glia cells with large vesicular nuclei and visible cytoplasm are present in both gray and white matter. In the central part of the hemorrhagic focus are large numbers of polymorphonuclear leukocytes and areas in which the tissue stains a dull, diffuse blue, suggesting necrosis. The opposite side of the cord shows a small area of hemorrhage, considerable edema of all the structures, and a mild lymphocytic perivascular exudate.

The pia is comparatively unaffected by the process, showing only occasional lymphocytes about the vessels.

Section 2: Lower cervical. Changes in the cord are similar to those in Section 1. There is a mild lymphocytic infiltration about the branch of the anterior spinal artery in the anterior fissure, and scattered lymphocytes among the anterior and posterior root bundles.

Section 3.—Lower dorsal. Very marked edema throughout the cord, which, with several large areas of hemorrhage, distorts the outline of the gray matter. Perivascular exudate as in Section 1. There are collections of lymphocytes, polymorphonuclears and large mononuclear cells in the pia about the points of exit of the anterior roots. There is no exudate, however, among the nerve bundles themselves.

*Alzheimer's Lichtgrün Stain.*—Cortex: Large granules staining with osmic acid are found rather abundantly in the cells in the perivascular spaces of the white matter, and to a small extent in the vascular endothelium of both cortex and white matter, and in a few nerve cells. No ameboid glia.

Lumbar Cord: Very heavy black deposits in the nerve sheaths everywhere in the white matter and in the nerve roots. Numerous glia cells with large vesicular nuclei and ameboid bodies are present in the white matter. These cells frequently contain vacuoles or black granules. The cord is infiltrated with hemorrhage.

*Mallory's Phosphotungstic Acid Hematoxylin Stain.* — No increase of fibrillar glia in cerebrum, cerebellum or cord. Examination of numerous cresyl-violet, thionin and Zenkereosin-methylene blue sections reveals no bacteria.

*Summary.*—An acute diffuse inflammation of the cord, characterized by extensive hemorrhage, heavy perivascular infiltration of lymphocytes, combined with smaller numbers of polymorphonuclear leukocytes, ameboid glia and fatty degeneration of the fibers in the cord and nerve roots. The nerve cells are in general well preserved, and there is no neurophagic activity. The centers of the large hemorrhagic foci show beginning necrosis with large numbers of polymorphonuclears.

The cortex shows a mild meningeal lymphocytic reaction, small deposits of lipoid in nerve cells and vascular endothelium, occasional perivascular lymphocytes and phagocytes, and in one section a marked satellite reaction with slight degenerative changes in the nerve cells.

As I intimated in the beginning, little success has been met in the search for cases like the one just reported. Of course a number of cases of anterior poliomyelitis have been reported with more or less hemorrhage into the gray matter, also many cases of more or less diffused myelitis, with hemorrhage. None of these, however, seem to correspond exactly to my case.

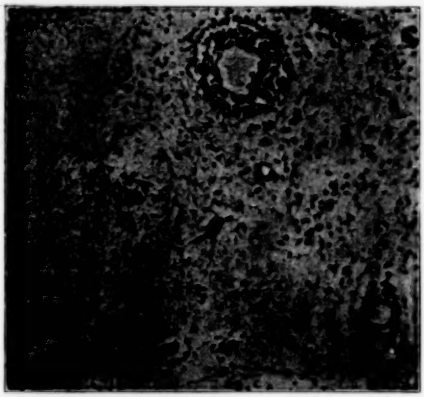

Fig. 2.—Case 1, E. W. Dorsal cord. An area from the anterior horn, showing lymphocytic perivascular infiltration. The nerve cells are intact.

Wyss reported before the International Congress in 1898 a case of hemorrhagic myelitis and phlebothrombosis of the spinal cord, in a girl of 12 years. This process, however, was found to be dependent on a tumor of the cervical cord, and pathologic lesions did not extend above this area.

Warrington and Owen have since reported a case somewhat similar. The history is as follows:

A man 41 years old. Illness began with chill, and three days later he had a temperature of 101. He then seemed to improve, but four days later he developed sensory and motor paralysis of both legs, with sphincter involvement. The paralysis ascended during the next four days until the respiratory center failed.

At necropsy the cord at various levels showed masses of intraspinal hemorrhage, more severe in the dorsal region, and corresponding chiefly to the anterior spinal system of arteries. A distinctive feature was the great dilatation of the small vessels, in both gray and white matter. The pia also showed greatly distended vessels and cell extravasation. Under high power the vessels showed wall thickening and neighboring necrosis of tissue. The cornual cells and nerve fibers exhibited all degrees of degeneration when near the vascular disturbance. Beyond these zones the nerve structures were intact. The brain above the medulla was normal. No micro-organisms could be detected.

This case, though dissimilar, is more like Case 1 than any other I have found. By way of comparison, let us now consider Case 2.

Case 2.—E. C., a young man of 26, of previous good health, was occupied as a chemist in a rubber mill.

Three weeks before I saw him in consultation with Dr. Prouty of North Brookfield, he began to complain of headaches and feeling tired. No marked symptoms, however, developed until four days before, when the patient complained of slight numbness and weakness of both legs. This gradually became more marked, and three days later there was slight drooping of the left eyelid, with extension of the weakness to the thighs.

On physical examination, July 16, 1913, patient appeared fairly well nourished. Pupils reacted normally. There was slight impediment of speech and left facial paralysis. The knee jerks were absent, also the plantar and Achilles reflexes. Weakness of the legs was marked, but sensation was unimpaired except subjectively. Patient was sent to Memorial Hospital and lumbar puncture done at once.

Spinal fluid examination: Pressure normal, fluid clear, globulin positive, Fehling's reduced. Cell count 14, practically all lymphocytes.

The following day patient was unable to stand and paralysis was beginning to involve both arms. Two days later the muscles of the abdomen and chest as well became involved, causing more shallow respiration. The cranial nerves other than the seventh showed no definite involvement. The paral-

ysis progressed, and the patient died of respiratory failure on July 26. The temperature had not reached 99 at any time and the pulse rate varied from 80 early in the illness to 120 toward the end. Urine was normal except for slightest traces of albumin.

Blood Examination: Hemoglobin, 90 per cent.; leukocytes, 11,100; erythrocytes, 5,628,000. Differential: Polymorphonuclears, 71 per cent.; lymphocytes, 21 per cent.; large mononuclears, 6 per cent.; mast cells, 1 per cent.; eosinophils, 1 per cent.

*Necropsy.*—By Dr. Hunt, three hours after patient's death. Nothing remarkable about the viscera of the chest and abdomen except that the distal part of the ileum was considerably injected and there appeared to be a general enlargement of the intestinal lymph nodes. Many of these nodes were the size of a cranberry bean and firm to pressure. The kidneys were slightly enlarged, but had normal markings and freely removable capsule.

The spleen was slightly enlarged and showed some signs of congestion. Cultures taken from the heart and subdural space failed to produce any organisms. On removal of the calvarium an excess of edema and considerable vascular congestion was noted in the meninges. The arachnoid was glistening and appeared somewhat less transparent than normal. The meninges of the cord likewise gave the appearance of congestion and edema.

On fresh section of the cord and brain no gross pathologic lesions were evident.

It was planned to inject emulsions of spinal cord from this case into monkeys to help establish the etiology, but, on account of the absence of the laboratory staff from two hospitals, it failed of accomplishment.

For lack of space, the microscopic findings are only summarized in this report.

*Summary.*—A widespread degenerative process in the nerve cells of the cerebrum, cerebellum, medulla and cord. The affected cells are frequently surrounded by others which appear normal, and no particular groups can be said to be peculiarly involved. There is a moderate satellite reaction, moderate perivascular lipoid deposits, and slight perivascular lymphocytosis in both pia and nerve tissue. The nerve roots, both cranial and spinal, show small lymphocytic deposits.

The pathologic picture is one which has been frequently described in cases of Landry's paralysis, that is, a widespread degeneration of the nerve cells with scanty perivascular exudate. The process in the present case is one which strikes the nerve cells differentially. Some fade out with, others without satellitosis. The picture is compatible with a purely toxic condition.

Further discussion of this case is postponed until after a brief summary of the following case.

CASE 3.—A boy, 14 years old, was always well until Sept. 13, 1913, except for an accident to his head a year previous, at which time he received tetanus antitoxin. Two weeks previous to September 13, he had returned from a vacation at the shore in excellent health.

The early symptoms noted were headache and fever, which, on the afternoon of the 13th, reached 102.5. The headache, fever and malaise continued the next day, and during the night of the 14th paralysis of both legs developed. This paralysis gradually ascended during the next thirty hours until the thighs, abdomen and arms and respiratory muscles became in sequence involved. No pain was complained of. There was some paresthesia, but no actual anesthesia of the limbs. The deep reflexes of both legs and arms were absent. The paralysis was flaccid. Lumbar puncture was done by me at this time, September 16, on being called in by the family physician.

The spinal fluid was under moderate pressure, but was not turbid. The cell count was 68. Globulin was positive with both ammonium sulphate and Noguchi. Differential count (Alzheimer method): Lymphocytes, 0.83; endothelial cells, 0.12; polymorphonuclears, 0.5; plasma cells, 0.

Though the patient did not rally under treatment, he lived until 6 a. m., September 20, when both heart and respiration failed.

This case would be difficult to differentiate from the other two, without the aid of a spinal fluid examination, but with the differential cell count it must be put down as an anterior poliomyelitis (acute ascending type).

I regret that the family physician did not heed my request for a necropsy in this case.

The pathology of acute poliomyelitis being familiar to you, I am offering the following schematic differentiation of three types of acute ascending paralysis, as exemplified by the three cases above reported.

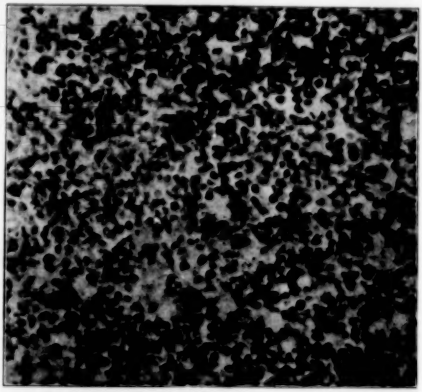

Fig. 3.—Case 1, E. W. Area of hemorrhage in the gray matter.

### RELATION TO HEMATOMYELIA AND HEMORRHAGIC ENCEPHALITIS

While there is little chance of confusing as striking a case of hemorrhagic myelitis as Case 1 with a typical case of spontaneous hematomyelia, the clinical and pathologic relation of the two should be mentioned, especially as there have been many cases reported in which the clinical symptoms would leave one in doubt whether the process was inflammatory, hemorrhagic or both. Important clinical points to differentiate hematomyelia from acute diffuse hemorrhagic myelitis are: the absence of fever, the suddenness of the onset without premonitory symptoms, often with acute pain, the rapid sequence of paralysis localized in the part corresponding to the hemorrhage, localized anesthesia, lack of progressive extension to new areas, normal white count and normal or nearly normal, spinal fluid constituents.

The pathologic lesions of hematomyelia may be distinguished by their circumscription, the absence of inflammatory products, the picture of blood extravasation transversely, with subsequent ascending and descending degeneration of the tracts, in some cases tubular hemorrhages in the gray matter, and, when not traumatic, intact meninges.

In comparing hemorrhagic myelitis to hemorrhagic encephalitis, or encephalomyelitis, as a pathologic process, certain resemblances appear. For instance, both have the ear marks of an infectious etiology, the hemorrhage being evidently secondary to an inflam-

matory process in which the meningeal vessels are involved. Strümpell's first case of acute hemorrhagic encephalitis, it will be recalled, followed a bronchopneumonia. An enlarged spleen and other signs of infection were noted. Cultures from the brain, however, were negative. He assumed a primary local infective agent with secondary hemorrhages.

D'Allocco, too, reported a case of acute polioencephalitis in a child, with sudden onset of inflammation symptoms. At necropsy there were vascular occlusions of the cortical vessels following an endophlebitis or endarteritis.

Langbein and Oeller discuss at length the pathology of a case of acute hemorrhagic encephalitis occurring in a woman of 35 years whose acute symptoms lasted only two days. Death occurred one-half hour after lumbar puncture. The spinal fluid was under some pressure and was blood stained. It showed a positive globulin and microscopically a great excess of polymorphonuclear leukocytes but very few lymphocytes. All cultures remained sterile. On section the brain showed areas of thrombosis and hemorrhagic transudation. These authors regarded it as difficult to determine whether the thrombosis was primary or secondary. Because of the infiltration extending to all the vessel coats and even to the connective tissue, and the presence of meningeal affection, an inflammatory origin would seem likely; the absence of encephalitic changes, however, led the authors to theorize that the extensive arterial oozing may have been due to the thrombotic plugging of the veins. An interesting feature of this case is that the patient had a patent foramen ovale, though no mention was made of clinical phenomena therefrom. The spinal fluid characteristics, with excess of blood and polymorphonuclear cells, are in striking accord with my Case 1.

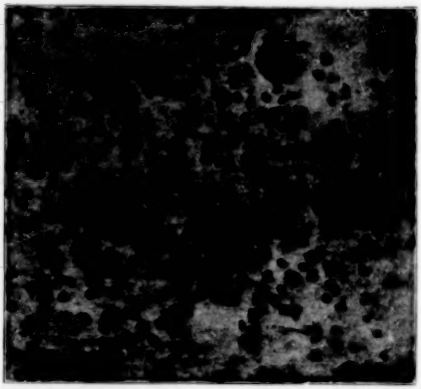

Fig. 4.—Case 1, E. W. Exudate, showing the large proportion of polymorphonuclear leukocytes, beginning necrosis and the presence of blood pigment.

### ETIOLOGY

In the absence of positive proof of the presence of organisms in Case 1, all cultures being negative, and no bacteria found in tissues, we must resort to theoretical grounds for probable etiology.

Barlow, Schiff and several others have reported cases of myelitis consequent to measles, typhoid and other infectious diseases, and I now have under observation a case of localized myelitis following pneumonia. The primary symptoms in Case 1, however, were confined to the spinal cord.

Though this girl was generally fatigued, no evidence as to the point of entrance of an infective agent is at hand. That an infectious agent was at work, however, is suggested by the temperature, white count and prostration, which were in contrast with Case 2.

The pathologic findings, moreover, bear convincing evidence of an infectious as against a purely toxic reaction, as characterized in Case 2.

In spite of these appearances, it is safe to say that the ordinary infectious organisms are absent, as are, apparently, the ovoid bodies and toxic products of anterior poliomyelitis. At any rate, no characteristic reaction was produced in monkeys by injection of the glycerinated cord from Case 1.

The primary locus of the inflammation in myelitis has led to spirited discussion; whether in the circulatory apparatus as advocated by Mayer and Schmaus,

TABLE 1.—DIFFERENTIAL DIAGNOSIS

| | Ascend. Hem. Myelitis | Landry's Paralysis | Poliomyelitis |
|---|---|---|---|
| Onset | Sudden constitutional symptoms. High fever. Severe pains in legs. | Mild prodromata. Paresthesias. Little or no fever. Pain absent. | Sudden constitutional symptoms. Fever early. Headaches, backaches. |
| Course | Short duration after hem. occurs. Continuous fever. Complete sensory and motor paralysis, ascending type. Peripheral nerves not involved. Cranial nerves not involved. Sphincters paralyzed. Respiratory failure. | Duration may be prolonged. Fever absent. Motor paralysis complete, only slight sensory. Asc. type. Peripheral nerves occasionally involved. Cranial nerves occasionally involved. Sphincters intact. Respiratory failure. | As paralysis appears, fever begins to subside. Motor paralysis of certain limbs. Mild sensory, or absent. Peripheral nerves seldom involved. Cranial nerves seldom involved. Sphincters occasionally involved. Resp. or heart fails. |
| Elec. React. | Course too short for abnormalities. | Normal faradic. Normal galvanic. | R. D. develops in paralyzed limbs. |
| Atrophy | None | None | In paralyzed limbs. |
| Recovery | Not in typical cases | Occasionally complete, even after nearly complete paralysis. | In most cases. Atrophy of paralyzed limbs with contractures. |
| White Count | High | Normal or slight | High early, slight later. |
| Spinal Fluid— | | | |
| Pressure | Plus | Normal | Plus. |
| Aspect | Bloody | Normal | Normal. |
| White Cells | 100 + | Under 20 | 20—100. |
| Red Cells | Profuse | None | Occasional. |
| Lymphocytes | Moderate | Occasional | Profuse. |
| Endothelial Cells | Occasional | Rare | Occasional. |
| Polymorphonuclears | Profuse | Rare | Rare. |
| Plasma | Occasional | Rare | Occasional. |
| Disintegrated | Plus | None | Rare. |
| Globulin | 2 plus | Plus or minus | Plus. |

the ganglion cells (Charcot), or the glia tissue (Goldscheider, Marinesco). While the evidence in our case points to the primary involvement of the blood vessels, especially as the nerve elements are practically intact except where overwhelmed by the hemorrhage, it must be admitted that in those areas the destruction of all three tissues is fairly complete. Leyden observes that primary hemorrhages of the spinal cord are exceedingly rare, except those due to concussion, and concludes that, anatomically, a sharp separation between primary hemorrhage with subsequent myelitis from primary hemorrhagic myelitis is only possible in the rarest cases.

Circulatory factors affecting the occurrence or extent of hemorrhage must have some consideration. For instance, the permeability of the vessel coats must be dependent on the individual resistance of those coats to the disintegrating power of the toxic products. A factor that needs consideration is the liquefaction or noncoagulability of the toxic blood. Still another is forced on us by Case 1, namely, the open foramen ovale. We can little more than speculate as to the impaired resistance of the imperfectly oxygenated blood and the abnormal duties which fall on the capillaries thereby, but it cannot be disregarded as a factor, after its occurrence in this striking case and the case of Langbein and Oeller above referred to.

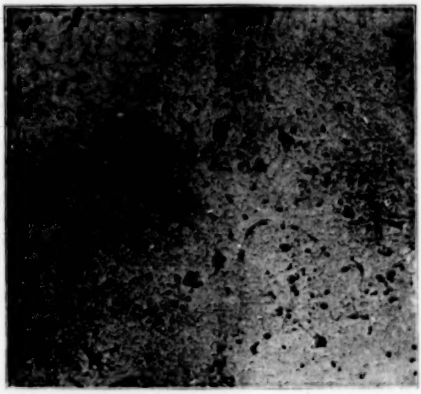

Fig. 5.—Case 2, E. C. Nucleus of VII, showing degeneration of the nerve cells and the presence of satellites.

*Transmissibility.*—It may seem unnecessary to discuss the transmissibility of hemorrhagic myelitis when the agent is unknown, but it may be helpful to draw a contrast on an etiologic basis between the three cases reported above. Assuming that Case 3 was a fulminating case of poliomyelitis, the success of Flexner, Noguchi and others in direct transmission of the disease to monkeys, would warrant the expectation of a similar result from this boy, had his spinal cord been obtainable. On the other hand, the glycerinated cord from Case 1 produced no lesion in monkeys, and, so far as this evidence goes, the condition is not similarly transmissible.

The foregoing data likewise are of some importance in making a differential diagnosis between the three types of ascending paralysis, since Case 1 has failed experimentally to produce symptoms of poliomyelitis in monkeys, while Case 2 is typical of ascending toxic paralysis (Landry) from no case of which, so far as I can ascertain, have the globoid bodies been developed or poliomyelitis caused in monkeys.

In this connection I might state that, in a recent personal communication, Dr. Flexner states that he is unaware that any positive infections of monkeys have occurred from cases of typical Landry's paralysis.

It may be remembered that Dr. Gordinier reported before the American Neurological Association last year a case of Landry's type; the spinal cord was then in the hands of Dr. Noguchi for inoculation. Evidently the inoculation in this case was unsuccessful, for a recent communication from Dr. Noguchi fails to throw any light on the transmissibility of this disease.

The procedure which to me appears to give the greatest aid in practical differentiation of the three types is the spinal fluid examination, especially the cell count by the Alzheimer method.

Of course, the mere appearance of a fluid which is sanguinolent, that is, uniformly mixed with blood and not coagulated, indicates the hemorrhagic type, but the presence of an enormous preponderance of polymorphonuclear leukocytes over lymphocytes is an effective differentiation from either the Landry's or the poliomyelitic type. The differential count is even more necessary as between Landry's and poliomyelitis,

TABLE 2.—PATHOLOGIC DIFFERENTIATION

| | Ascend. Hem. Myelitis | Landry's Paralysis | Poliomyelitis |
|---|---|---|---|
| Spinal Cord— | | | |
| Cells | Not degenerated | Degenerated | Degenerated. |
| Reds | Profuse | None | Few. |
| Lymphocytes | Increased | Few | Many. |
| Leukocytes | Many | Absent | Few. |
| Ameboid glia | Present | Absent | Present. |
| Endothelial cells | Present | Absent | Present. |
| Vessels | Engorged and ruptured | Changes slight | Engorged at anterior horns. |
| White matter | Edematous, infiltrated with hemorrhage. Leukocytes, lymphocytes, etc. | No edema. No hemorrhage. Occasional lymphocytes | No edema. No hemorrhage. No lymphocytes. |
| Gray matter | Same as white, cells intact or disintegrated | Slight, injected with lymphocytes. Cells degenerated | Marked infiltration with lymphocytes. Cells degenerated. |
| Blood pigment | Marked | None | Slight. |
| Lipoid | Cortex | Cord and cortex | Rare. |
| Periph. Nerves | Normal | Normal, or occasional involvement | Secondary degen. (motor). |
| Pia— | | Slight engorgement | Slight engorgement. |
| Vessels | Engorged. Edema | No edema | Slight edema. |
| Infilt. reds | Many | None | Few. |
| With lymphocytes | Few | Few | Many. |
| Polymorphonuclears | Many | None | Rare. |

for the gross appearance may be identical and the globulin test is apt to be present in both, but any marked pleocytosis, especially of lymphocytes, with traces of blood or endothelial cells is a strong indication against Landry's type and in favor of acute poliomyelitis.

The comment of Dr. Flexner, who, with his staff, was good enough to examine pathologic specimens from this case as well as to inoculate monkeys with the glycerinated cord, was as follows:

"I have examined the specimens and find the lesions as described by your pathologist. They are not typical of poliomyelitis. The only feature in which they resemble poliomyelitis is the infiltration about the vessels in the pia and in the gray matter; but the infiltrations there are relatively slight for the degree of hemorrhage and the cells in some places are chiefly polymorphonuclear and not lymphocytic. On the other hand, the nerve cells do not show the usual necrosis with invasion of leukocytes — or neurophages.

"The inoculations of monkeys with the glycerinated cord were unsuccessful. This does not necessarily mean that the specimen was not derived from a case of poliomyelitis, since it is not possible to transfer all specimens of glycerinated cord from cases of poliomyelitis to monkeys; but taken together with the nontypical character of the lesions I am inclined to think that the case was probably not one of epidemic poliomyelitis."

While it was not my intention to enter the arena of discussion regarding the nosology of acute inflammatory conditions occurring to the spinal cord, I find myself interpreting the suggestions which the foregoing cases seem to bring.

On general principles I believe that names should be descriptive of pathologic processes, and this precept has evolved the somewhat unfamiliar title of my paper. No other designation seems fitting to describe Case 1.

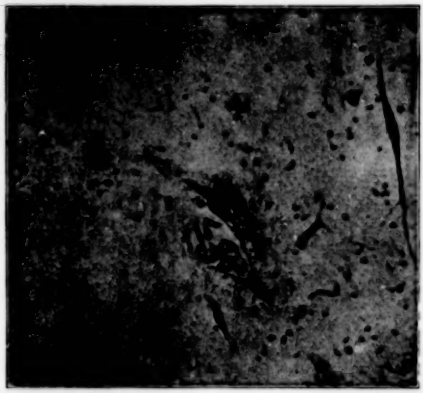

Fig. 6.—Case 2, E. C. Lumbar cord, showing cells of the anterior horn. Small numbers of lymphocytes and an area of fibrin network about a vessel. A degenerated cell on each side of the vessel.

When we come to Case 2, its striking resemblance to the original case reported by Landry in 1859 makes us confident that it belongs to this group, so peculiarly free from macroscopic lesions.

The view held by some authors that no case showing the slightest microscopic change from the normal can properly be called Landry's seems to me untenable. In the first place, it ignores the fact that modern laboratory methods and equipment bring to light lesions which would have been undiscovered not so many years ago. Further, it is reasonable to suppose that any etiologic factor virulent enough to cause death must be productive of pathologic changes, whether or not they escape the microscope. These changes naturally become more marked, too, according to the nonresistance of the victim's tissues.

It seems that we should rely more on the type of tissue changes which accompany the clinical data and determine whether they appear to be toxic or grossly inflammatory.

In going over the literature I am not unmindful of the confusion which seems to exist in the minds of many as to the meaning of Landry's paralysis, and, in a measure, I sympathize with the accumulated opinion of Wickman, Taylor, Schmaus and others that the advisability of retaining the title is questionable. Unless, however, these or other authors supply the proof that Landry's paralysis and anterior poliomyelitis are identical it seems our duty to remember the type even though we forget the title.

The suggestion of Taylor to include practically all inflammatory conditions of cord and brain in the term "poliencephalomyelitis" appeals through its convenience, even as the all-inclusive term "psychoneurosis" in functional disorders, but if we all gather under one roof let us erect partitions in their proper places lest we sleep in the kitchen.

By continued animal experimentation and toxicologic research these myelitic diseases must yield up their true etiology and take their corners. Our pride in the work of Flexner, Noguchi and others should make us bent on furnishing them glycerinated material especially from Landry's type of paralysis, at the earliest opportunity, that our knowledge may increase. Until the time, however, that our laboratories can pin a label on the factors responsible for the three types above reported, I trust it has not been amiss to call attention to their apparent differentiation.

SUMMARY

An acute ascending hemorrhagic myelitis, as exemplified by Case 1, seems to occupy a unique place allied to, but not identical with, either myelitis or hematomyelia. Its clinical resemblance to acute ascending paralysis, either of the poliomyelitic or Landry's type, is striking, though closer analysis of symptoms and pathologic findings points to the existence, by the clinical data before us, of three distinct types of acute ascending paralysis.

Further confirmation of these types must wait on definite laboratory differentiation, which seems every day to be nearer completion.

25 High Street.

## ABSTRACT OF DISCUSSION

DR. CHARLES R. BALL, St. Paul: In my own work I have been somewhat uncertain as to the etiology of the cases grouped under the heading Landry's paralysis. Whether there is an ascending paralysis of an entirely different origin than the one caused by an acute poliomyelitis seems not as yet to have been proved. In spinal fluid examinations it is very important to differentiate between hemorrhages due to perforations of the blood vessels made at the time of the puncture and hemorrhage from some other cause. Centrifuging the fluid is perhaps the best means of making this

differentiation. In recent hemorrhage, after centrifuging, the spinal fluid becomes perfectly clear; in old hemorrhages, however, it always shows a yellow tinge due to the presence of the hematin in it. It seems to me that being absolutely certain as to whether the hemorrhage was caused by an accident in puncture, or by the disease itself was one of the most important points to be established in determining the diagnosis in Dr. Burley's cases.

DR. BENJAMIN T. BURLEY, Worcester, Mass.: I quite agree with Dr. Ball that it is very important to get spinal fluid without traumatic blood. It is usually fairly readily told whether the blood is traumatic or not, because usually the traumatic puncture shows blood at first and becomes clearer later. There is a typical appearance to blood which is thoroughly mixed with a spinal fluid and with increase of cells, for which some one seems to have coined the word sanguinolent. Unless one gets a satisfactory puncture the first time, it is advisable to repeat the puncture later.

## KNEE JOINT DISABILITY CAUSED BY HYPERTROPHY OF THE ALAR LIGAMENTS *

ROLAND O. MEISENBACH, M.D.
BUFFALO

Notwithstanding the well-defined surface anatomy of the knee joint, especially in its anterior portion, it is not always a simple matter to differentiate the actual condition within the joint in some of the disabled knees which come to us for relief. This statement is confirmed by many writers, and it appears several times in the literature. This is true especially in those cases which do not give classical symptoms

Fig. 1.—Patellar tendon, infrapatellar fat space and hypertrophied alar ligaments.

of one or the other of the many conditions which are constantly being encountered in joint surgery.

Not alone in the acute knee, but also in the chronic, do we frequently notice that definite subjective symptoms are absent. This, I believe, is one of the reasons for the frequency with which an acute disability of the knee joint is tolerated by the patient and terminates in a chronic disabled knee. Either the patient expects spontaneous relief, or the condition is deemed not direct enough for active interference.

The knee joint is constantly exposed to injury; this injury may be from external or from internal

Fig. 2.—Dark mass, irregularly defined and mottled. Hypertrophied alar ligament. Note acsamoid bone in posterior part of joint.

sources. The external sources comprise weak feet, irregular shoes, faulty alignment of limb following fracture of the leg or thigh, or both, besides the leverage twists, wrenches and actual direct violence.

The internal injuries may be induced by the knee joint's mechanism or a concomitant pathologic condition, or both.

### THE KNEE JOINT

Considering the fact that the knee joint is one of the most important, largest and quickest joints to become injured, one would expect that its internal arrangement, as far as the anatomy and mechanism are concerned, would be well understood by all who have to do with this joint. Its mechanism is not stable, and its anatomy differs in many instances.

Perhaps the extreme range of motion which the knee joint exerts is the cause of the variation; at any rate, I believe that many of its soft parts, especially in the anterior portion and those which have to do with the lubrication, are constantly subjected to change.

The function of the synovial membrane and its different parts, namely, (*a*) ligamentum mucosum and (*b*) alar ligaments, is to lubricate the cartilaginous articular surfaces of the gliding parts.

The anatomy of the knee joint is described by Tenney in a most thorough manner. I wish here only to emphasize some facts and to describe that which pertains to this paper, namely, the alar ligaments.

### ALAR LIGAMENTS OF THE KNEE JOINT

Normally, the alar ligaments are wing-shaped folds of synovial membrane extending from the mucosa, and are in my opinion part of the lubricating tissue.

* Read before the Section on Orthopedic Surgery at the Sixty-Sixth Annual Session of the American Medical Association, San Francisco, Jun , 1915.

They are the moving parts and find their place along the condyles of the femur in the anterior portion of the knee joint.

Considering the mechanism of the knee and the function of the vascular alar ligaments, together with their close proximity to the moving parts, it is not difficult to imagine that they might become hypertrophied, consequently interfering with motion in the knee joint, and thereby giving rise to symptoms. The condition has occurred in young and old in acute and chronic knees to a lesser or greater extent.

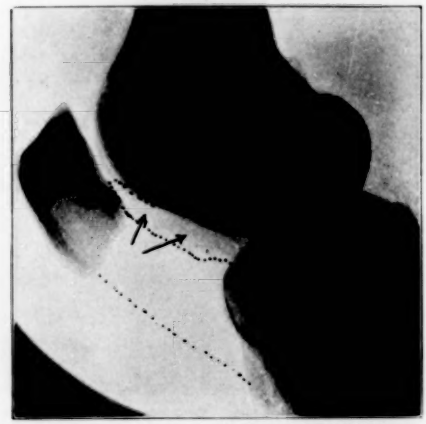

Fig. 3.—Note clear anterior portion of joint and the soft dark shadow which extends somewhat under the patella.

In those cases in which the diagnosis of hypertrophy of the alar ligaments had been made, there was either a history of a previous injury (as in Case 1) or a very active knee (traumatic functional) in an individual who had previously had an infection (Case 3).

Many other conditions (enumerated in the differential diagnosis below) were considered before making an absolute diagnosis. The roentgenogram was also used, and assisted materially. I mean that the hypertrophied alar ligaments and the mucosa can sometimes be seen and differentiated from other soft structures in the anterior part of the knee joint. The most important for diagnostic purposes is the infrapatellar fat pad in a well-prepared negative. The operative findings, together with the permanent relief given the patient, seem to confirm the diagnosis in some of the cases presented below.

Considerable has been written on derangements of the knee joint, which may cover many conditions causing disability. Hypertrophy of the alar ligaments may well nigh be included in it; however, I am not willing to accept derangements of the knee joint as a diagnosis for treatment, because in many instances by it relief cannot be given.

## DIAGNOSIS

The histories of the cases which have been diagnosed as disability caused by the hypertrophy of the alar ligaments have been those of trauma or those of disease and trauma, as has been stated above. Therefore, it has been necessary to study cases carefully and attempt to separate those occurring from trauma only, that is, external trauma, and those which have had some infection in which the anterior portion of the knee joint was previously made pathologic, owing to a congestion or an actual infiltration. Also, the histories of many of the patients that come to us with knee joint trouble are indefinite. They are irregular, indeed, and on examination the knee is not necessarily swollen, but at times one can palpate, as in extreme cases of villous arthritis, the villi; the thickened ligamentum mucosum, if not the alar ligament, on either side of the patella. These cases do not always show the capsule distended or the patella floating; the pain is chiefly noted on extreme flexion and extension of the knee joint, and in the anterior portion, the patient usually pointing to the patella, so that in some cases at first one is almost in doubt whether we are not dealing with a bursitis. In some of the cases, and especially those which show that infectious arthritis has been a predisposing cause, there may be a marked distention on both sides of the patella, and the patella may float.

The roentgenographic finding is of great importance. If the technic of making the roentgenogram is carried out with a view to exposing the soft parts, many of the soft structures of the knee joint can be seen on the negative, if not on the printed reproduction. The negatives illustrating this are of the softest variety. Some of the soft structures which are at times discernible are the patella tendon, the anterior fat pads, the ligamentum mucosum and the alar ligaments in suitable cases.

Fig. 4.—Note circumscribed dark area which proved to be thick alar ligament.

In one of the last cases with operation, in which a diagnosis of hypertrophy of the alar ligament was made, the internal alar ligament was elongated, very thick, deeply congested and actually adherent to the femur, so that every time the knee flexed, the synovial membrane was drawn inward. The joint had very little fluid within it.

Atrophy of the thigh and calf is frequently present, probably atrophy of disuse. Actual locking of the joint does not occur, but a sudden weakness of the knee may be complained of by the patient.

DIFFERENTIAL DIAGNOSIS

The conditions which are most apt to require differentiation from the hypertrophic alar ligaments are:

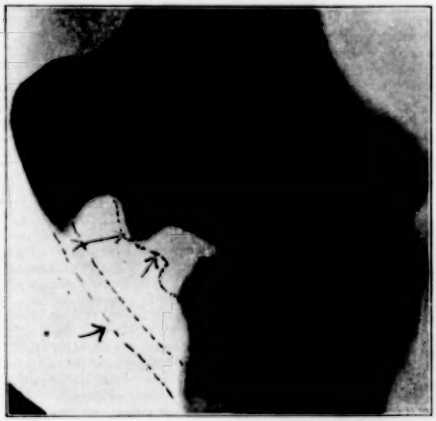

Fig. 5.—Note dark pronounced shadow. Operation proved it to be hypertrophied alar ligament.

villous arthritis, lipomas, loose semilunar cartilages, atrophic arthritis, knee joint strain, osteo-arthritis, infectious arthritis, loose bodies in the knee joint, and bursitis. As has been said before, any one of these conditions may also be associated with hypertrophy of the alar ligaments, and therefore they must necessarily be considered in dealing with the subject; but the cases herewith reported are chiefly those in which none of these conditions were marked, and in which apparently the hypertrophied alar ligaments were causing the actual disability, and after they had been removed the disability of the knee joint passed away, giving the patient a useful joint without symptoms.

*1. Villous Arthritis.*—In this we are more apt to have a history of infection. The knee joint swells more readily and the capsule is frequently distended and well defined, with the quadriceps pouches full. In palpating, one can frequently feel the fringes, or villi in the quadriceps pouch. On opening the knee joint, excessive straw-colored fluid may be seen, and everywhere elongated villi from the synovia are evident. The subjective symptoms are also irregular, but are more pronounced. Frequently, there is actual limitation of motion on flexion.

*2. Lipomas of the Knee Joint.*—These are usually found in lipomatous individuals. The same condition that is found in the knee is frequently found in the ankle. The patella, as a rule, does not float.

*3. Semilunar Cartilages.*—In loose semilunar cartilage we have many and varied symptoms, from the locking of the knee to a snapping on the internal or external aspect of the joint when motion is attempted or when weight is borne.

*4. Atrophic Arthritis.*—Here we have a glossy skin, the atrophied bone, with erosion of the cartilage, which may be noted from the roentgenogram, and perhaps the joint interspace diminished. Frequently, other joints besides the knee joint are involved and limitation of motion is present.

*5. Knee Joint Strain.*—This may simulate hypertrophy of the alar ligaments, but in the former the slightest motion of the knee laterally will bring on a severe attack of pain. Therapeutic measures directed toward the foot may be of great assistance in differentiating.

*6. Hypertrophic Arthritis.*—This is the easiest to differentiate because the Roentgen ray assists materially in showing the osteophytes and the roughened articular joint surfaces. Limitation of motion is frequently found, and there is a grating or creaking of the knee joint when active or passive motion is attempted over the joint. The skin is rough and dry, and other joints are involved, which show similar pathologic conditions.

*7. Infectious Arthritis.*—In this we frequently have other joints involved besides the knee, as, for instance, hands and wrists or perhaps the ankles. The knees may become swollen and remain so for a longer or shorter period, and after this swelling subsides there is still a disabled knee, or one which gives intermittent symptoms of disability, chiefly on extreme flexion or extension. It is in this type of case that we should look for hypertrophy of the alar ligaments, and if the danger of stirring up an infection is remote, the removal of the alar ligaments will allow the knee to be used normally.

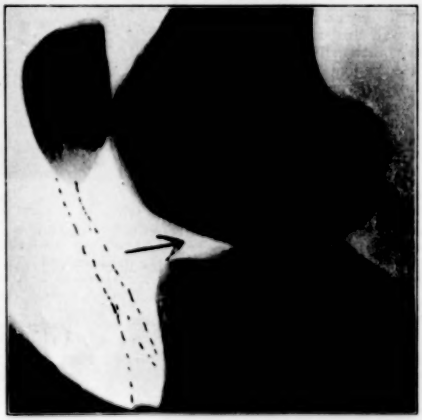

Fig. 6.—Normal knee. Note clear joint interspace.

*8. Loose Bodies.*—These are well shown in the stereoscopic roentgenogram, and if they have created a pocket, the surface of the tibia or the articular surface of the femur will show marks of destruction. Locking of the joint in these cases is classical of the condition.

*9. Bursitis.*—Palpation will often produce pain over the bursa, which is sometimes visible, although it may

be at times confusing, especially when the patient gives a history of kneeling, or the bursitis is mild. The knee itself is not swollen, and on the lateral aspect of the patella in the joint line nothing abnormal is felt. However, if the bursitis is due to systemic infection, then again we may have it associated with hypertrophy of the alar ligaments.

### TREATMENT

There is only one permanent treatment for knee joints with hypertrophied alar ligaments; that is, their removal. Temporary relief, or symptomatic relief, may be given in some cases without removal. Limiting the motion of the knee and strapping give relief to symptoms only, and should not be advised except in rare instances, as enumerated above. The operation of arthrotomy, advised by many, if done in conservative and skilful hands, offers very little danger, and the old idea that an operation on the knee joint means a stiff knee is, I am glad to say, past. Formerly, perhaps, this belief was well founded; but with improved operative technic in these cases the danger is at a minimum, both as to obtaining a stiff knee and as regards sepsis; it is, in fact, no greater than in some of the other surgical procedures of the day.

In the technic of arthrotomy for the purpose of removing alar ligaments, certain principles must necessarily be observed, the same as with any other arthrotomies of the knee joint. First, there should be perfect asepsis; second, the incision should be as small as possible; third, the knee joint should be in a position of semiflexion. All bleeding should be checked before the capsule is opened; the capsule should not be held with hemostats. The finger need not enter the knee joint.

Fig. 7.—Note dark joint interspace.

In removing the alar ligaments, they should be clamped at their base with a very fine hemostat, removed above the hemostat with scissors so as to insure no hemorrhage within the joint. Rarely tying within the joint is necessary. The capsule should be closed with silk or chromic gut and the knee joint bottled tightly and not drained. Passive motion should be done early, and the patient may walk as soon as the incision is firm. A few cases cited below will serve as an illustration:

Case 1.—Mr. B., gardener, aged 22, operated on Nov. 3, 1911, gave the following history: Two months previously, while lifting sod, using his right knee joint to assist the spade, he found his knee going weak. He gave up work and found that whenever he bent his knee or attempted to get out of a chair, he had pain. After resting the knee joint it grew better; but as soon as he attempted to walk much or ride a bicycle, the knee became painful. The knee was not swollen, and no crepitation was felt, but patient complained of pain after the knee was bent in extreme extension and flexion. A roentgenogram was taken.

A diagnosis of hypertrophy of the alar ligaments was made. The knee joint was opened by an incision on the inner border of the patella. The capsule was noted to be drawn into the joint, and when the capsule was opened, the knee joint was held in position of semiflexion. After retracting, it was noticed that two or three tabs extended from the mucous membrane in the anterior portion. The fibrous band could be seen tensely stretched, apparently from the ligamentum mucosum down to the surface of the tibia, suggesting that synovial tabs had become adherent. These tabs (alar ligaments) were removed, and the joint closed tightly. There was very little bleeding during the entire operation. Motion of the knee joint was begun on the seventh day and convalescence was uneventful. Patient returned to work.

Case 2.—Mr. G., aged 19, athlete, seen Dec. 21, 1911, gave a history of suddenly having his right knee become weakened, and at times painful. He said that he had had the habit while walking of throwing his knees in strong extension. The knee occasionally became swollen, but did not lock. A roentgenogram was taken.

The anterior portion of the joint showed a slightly dense shadow in the region of the ligamentum mucosum. Examination of the knee showed that the surface anatomy was apparently normal; no crepitation was felt on motion, and no swelling. The right foot was considerably pronated; otherwise the patient was in excellent health. Blood count negative.

A diagnosis of hypertrophied alar ligaments was made. Operation, Jan. 5, 1912. Incision on inner aspect of patella. Knee joint opened according to special technic; synovial membrane relaxed; no fluid in joint; alar ligaments removed; no other tabs protruding from synovial membrane. Patient had an uneventful recovery. Symptoms disappeared. Patient seen three years after the operation; no recurrence.

Case 3.—Mr. J., chauffeur, aged 21, had niesserian infection one year ago. Previously had been treated for flatfoot. To all appearances perfectly well, but while driving his car noticed that his right knee was painful and slightly swollen. This swelling has persisted for several months. Slight thickening felt on the internal and external aspect of the patella. Roentgenoscopy revealed thickening in anterior portion of the joint, extending well into the joint.

A diagnosis of hypertrophy of alar ligaments was made. July 18, operation, arthrotomy of right knee joint. Incision of internal aspect of patella. On opening the capsule considerable fluid emitted from the joint. Synovial membrane injected and quite vascular. Ligamentum mucosum and alar ligaments thick and boggy. Alar ligaments removed, considerable hemorrhage, one squirter from each tied. Knee joint closed tightly, no drainage. Convalescence uneventful. Patient able to continue occupation as chauffeur up to the present writing.

Case 4.—Miss P., aged 33, occupation institutional work Has always been well, with the exception of her knees, which have been painful intermittently. Patient has been accustomed to kneel frequently, many times coming down firmly. Last several months has noticed when she attempts to get up there is sharp pain, which disappears after a while,

but recurs. Examination of knee joint shows slight roughening of the skin over the patellar bursa of both knees. Knee joint not swollen and no crepitation. Extreme flexion elicits some pain. Roentgenogram taken and a rather diffused shadow of homogeneous consistency seen a short distance below patella.

Diagnosis after eliminating other conditions, hypertrophy of the alar ligaments. Operation, arthrotomy, May 14, 1915. After capsule incised, ligamentum mucosum and alar ligaments were seen to be congested and one internal alar ligament adherent to the femur. The alar ligaments were removed; knee joint closed. Recovery uneventful.

### CONCLUSIONS

In presenting this paper, it was my object especially to call attention to the variety of conditions which may be found in disabled knees, all of which may present more or less some of the same symptoms, but if carefully studied, will be found to be distinct entities; but more than that, to attempt to call attention to the type of knee joint which is so frequently seen, in which the symptoms are so irregular that only by a thorough search, and in some cases by means of eliminating the other conditions, the patient will obtain relief.

140 Allen Street.

### ABSTRACT OF DISCUSSION

DR. FRED. J. FASSETT, Seattle: Dr. Meisenbach asked me to participate in this discussion, and I promised to look up my anatomy on alar ligaments and where they are to be found. In doing so I was quite impressed with the exact spot, because they lie just where I have found symptoms of a very definite nature that I have heretofore been unable to call by any name. I have been content with the general sweeping diagnosis of an internal derangement of the knee joint. The definite symptoms I speak of are these: Not the grating that accompanies damage to the bones, but a creepy feeling and soft crack which occur when you move the patella, as if it were rubbing over some pulpy substance. I should like to ask Dr. Meisenbach, in closing the discussion, to say a word about his method of approach to this region.

DR. J. T. RUGH, Philadelphia: It has been my privilege to operate in about a dozen of these cases. To me the symptomatology is rather clearly defined, and it constitutes in my experience a distinct condition which in the vast majority of cases requires surgical interference for its correction. These cases, as I find them, usually present an intermittent hydrops; that is, there will be an injury to the joint from overuse of the part or from a blow or a fall, and this will be followed by an effusion into the joint, which subsides after a few days. After the subsidence of this joint swelling, examination of each side of the ligamentum patella will give a sensation as of a substance rolling away from the thumb. One can feel the mass slipping under the thumb. My plan has always been to make a lateral incision, either internal or external or both, according to the conditions present, and through that incision remove this ligament. It is very easily done with a pair of scissors. The result has been functionally perfect.

DR. ROLAND MEISENBACH, Buffalo: In answer to Dr. Fassett's question, I might say that the lateral incision has the advantage that in most knee joints by this route the alar ligaments are immediately exposed and are easily reached without exposing very much of the knee joint itself. It also has the advantage that in many of the knee joints there is very little hemorrhage by this incision. It is essential to take further precaution to prevent hemorrhage within the joint, also to prevent hemorrhage before opening the capsule. I would like to emphasize the fact that the capsule should not be clamped with hemostats, but should be held apart with silk retractors. I have always felt that the alar ligaments have been very much neglected, and I was glad to hear Dr. Rugh confirm this belief. I think that in many of our knee joints we obtain a history of intermittent symptoms, but these intermittent symptoms do not necessarily extend over regular times, as in intermittent hydrops. In my earlier cases I believed that the hypertrophy of the alar ligaments explained intermittent hydrops, but later experience has taught me differently. I wish also to emphasize the fact that patients suffering with hypertrophy of the alar ligaments assume a peculiar gait with a view of protecting their joint on all occasions. I believe this is partly psychologic, and partly due to the fact that the pain comes on suddenly and they expect it, but are unable to know exactly what motion of the knee joint brings it on. In some of the cases one should be conservative enough also to have the different laboratory tests made, and one should be on the lookout for other conditions, in which the hypertrophy of the alar ligaments may be a residual hypertrophy due to a general diathesis.

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## ROENTGENOGRAPHIC BONE CHANGES IN A CASE OF POLIOMYELITIS

G. B. HASSIN, M.D.
Attending Neurologist, Cook County Hospital

CHRISTINE LUKAS, M.D.
AND
R. O. BROWN, M.D.
CHICAGO

That the bones undergo atrophic changes in the course of poliomyelitis is a well-known fact, and the following case illustrates the extent such a bone atrophy may attain:

*History.*—Man, aged 39, entered the Cook County Hospital with a complete paralysis of the lower limbs. The patient states that he has been unable to use his legs since the age of 2 years, when he sustained a fall, following which he was confined to bed for about two years. Until the age of 10 he lived at home, then for five years at an orphan asylum, and then was an inmate at the Dunning asylum up to the age of 34, whence he was transferred to the Oak Forest infirmary. Here, he states, the inmates began to accuse him of various things. He could hear them "talking" about him, "sneering" at him, and thinks it quite possible that "they have formed a conspiracy against" him. Any other diseases, including venereal diseases, he denies.

His mother died at Dunning insane asylum when the patient was about 5 years old. The cause was some form of insanity. The father died from an unknown cause when the patient was 12 years old.

*Examination.*—The patient is a rather poorly nourished middle-aged man, somewhat apathetic, but oriented as to time, place and persons. He answers questions intelligently, but is emotional when, with tears in his eyes, he complains of "charges" preferred against him and of the hospital not being "a safe place" for him. He cannot walk, and keeps the lower limbs flexed in the hip and knee joints, while the feet are drooping (Fig. 1). The legs cannot be extended beyond 135 degrees. There is some movement in the toes, which are irregular in their shape and growth. The second toe of the right foot is of the same length as the great toe, and the fourth is of the same size as the fifth. The left fourth toe is much smaller than the fifth. The size of the lower limbs is greatly diminished, entirely out of proportion to that of the upper half of the body, resembling the extremities of a boy. Thus, the length of the lower limbs is 21 inches, measured from the popliteal fold to the postero-inferior border of the os calcaneum, as against 31 inches, which is about the average normal length for his age. The length of the feet, measured from the posfero-inferior border of the os calcaneum to the extremity of the third toe, is 7

inches for the right, and 6¾ inches for the left (normal about 9¼ inches). The circumference of the lower limbs, at the level of 10 cm. above the external malleolus, is 5¼ inches on either side (instead of 8 inches); 12 cm. below the knee joint it is 6¼ inches on either side (the normal average is about 11¼ inches). At the level of 15 cm. above the knee it is 9¾ inches, against 15 inches, which is the average normal. All the muscles of the lower limbs appear greatly reduced in volume, especially the extensors of the legs and feet, where fibrillary twitchings are marked. The movements, as abduction, adduction of the legs, flexion and extension, are possible, but greatly limited, and the muscle power in the atrophied limbs is almost entirely absent.

The electric examination reveals a complete reaction of degeneration in the muscles and nerves of the legs.

The tendon reflexes, as knee jerk and achilles, are absent on both sides, the plantar, cremasteric and abdominal present. The pupillary reflex and eye grounds are normal. Sensory disturbances, as well as those of the bladder and rectum, are absent.

Of other anomalies we should point out the small size of the head (microcephalous), and a marked lumbar lordosis and, at the level of about the second sacral vertebra, a dimple in the skin with a lipomatous nodule below it.

Thus, the examination shows a great decrease in size, or atrophy, of the lower limbs, which are diminished both in length and in width. The cause of this atrophy is undoubtedly an old poliomyelitis, in the form of a flaccid paraplegia, combined with a paralytic lordosis, secondary contractures in the knee joints and some signs of degeneration, as evidenced by the disfiguration of the toes, and small-sized head. The mental condition of the patient speaks for dementia praecox.

The paralysis and the atrophies are perfectly symmetrical in character, the shortened lower limbs resembling, when compared with the rest of the body, those of a 10 or 12 year old boy. The undersized condition of the lower limbs is to be ascribed to the atrophy of the muscles and bones. The muscular atrophy can be determined by means of the electric current, or palpation, and direct measurements, while that of the bones can be determined by means of roentgenoscopy. This shows (Fig. 2) that the femur and both bones of the leg are greatly reduced in size. The bones are thin, appear smooth, polished as it were, and deprived of their usual characteristics. The bone seems to be somewhat transparent, the thickness of the solid bone substance being greatly reduced. These changes are confined to the diaphysis only, and do not involve the epiphysis. All these changes, so well to be seen on the roentgenogram, were pointed out long ago by Joffroy and Achard[1] before the discovery of the Roentgen rays. They explained the changes by the lack of muscular activity, which is mainly responsible for the shape and irregularities of the bones. These, of course, must disappear or undergo some transformations in old cases of poliomyelitis, like ours, in which muscular contractions are absent.

Fig. 1.—Lower limbs of patient.

Fig. 2.—Roentgenogram showing reduced size of bones.

These findings were afterward fully confirmed by Archard and Levy[2] through roentgenoscopy, and also by Oppenheim[3] and Bruns.[4]

31 North State Street—Cook County Hospital.

1. Joffroy and Achard: Paralysie spinale aigue de l'enfauce, Arch. de méd. expér. et d'anat. path., 1889, i, 57.
2. Achard and Levy: Radiographie des os dans la paralysie infantile, Nouv. iconog. de la Salpêtrière, 1897, p. 324.
3. Oppenheim: Lehrbuch der Nervenkrankheiten, Berlin, 1908, i, 234.
4. Bruns, in Bruns, Cramer and Ziehen: Handbuch der Nervenkrankheiten im Kindesalter, Berlin, 1912, p. 327.

**Mental Defectives.**—We have come to realize that our moral judgments are inextricably mixed up with social judgments; that general intelligence, learning, experience, etc., are brought into play in the exercise of every moral judgment; that millions of brain processes are involved in every thought and act, and conduct is an expression of the whole machinery at work; that there is no ground for the presupposition of a separate sense that sits in judgment, approving or disapproving of our actions. In short, a mentality incapable of forming moral judgments is likewise incapable of forming normal judgments along other lines, and is (*ipso facto*) a defective mentality, and is demonstrable by a thorough examination of general intelligence, judgment, reasoning capacity, etc. These are mental defectives, and not moral imbeciles.—V. V. Anderson, *Boston Med. and Surg. Jour.*, Sept. 23, 1915.

## Therapeutics

### PNEUMONIA

As the season approaches when pneumonia begins to be more frequent, until, in February or March, it generally reaches its highest death rate, it is well to reconsider some of the fundamentals in its treatment.

In many cities and in most states pneumonia has become the chief cause of death, tuberculosis having given way to this infection. The pneumococcus is ever ready to attack any debilitated individual, and especially to add its attack to that of the influenza bacillus. The very fact that the death rate from pneumonia is increasing shows that the prognosis is not good. If the disease tends to recovery like most acute infections, it certainly needs a great deal of aid. A fatal issue can readily be hastened, if not precipitated, by misdirected efforts and by neglect. The great seriousness of this disease is due to its effect on the heart; consequently the care of the heart is of paramount importance.

The treatment may be discussed under various heads, as follows:

1. *Rest.*—This must be as near perfect as possible. Not only should the room be situated for the best possible fresh air, but it also should be as quiet as possible. Friends and relatives should not disturb the patient. The more he talks and the more he thinks, the more rapidly will his heart pulsate, the more rapidly will he breathe, and the more mentally restless and consequently sleepless will he be. Sleep and a quiet heart are more essential in pneumonia than in almost any other disease. Perfect rest does not mean that the patient should not be turned frequently, or that he should not have at times several pillows; in fact, it has lately been advocated for a patient with pneumonia to sit up once or twice a day for a short time, even in a chair. This is perhaps a little too radical, but the point should be emphasized that the circulation in the lungs should be changed by alterations in position. A patient with pneumonia should not lie flat all the time. Hypostatic congestions readily occur with pneumonia, especially if the heart's action is impaired.

2. *Fresh Air.*—It has now long been demonstrated that a pneumonia patient has less fever, a slower pulse, a better blood-pressure, and breathes less frequently in cool, clean air than in close house air, and this whatever the season. Wards on the roof are very valuable for hospitals in the treatment of pneumonia as well as tuberculosis. The balcony, veranda, or even tent treatment of pneumonia is advisable at certain seasons of the year with certain types of patients, when such facilities are obtainable. It is always essential that the room of a pneumonia patient should have more than one window — the more the better — and that these windows should be widely open, except when the patient is being bathed or his clothing is being changed. Under any circumstances it is not necessary to have a draft of cool or damp air blowing directly over the patient's face, but screens can modify the direction of the wind or brisk air. Very young children and old people should not be subjected to severe cold atmosphere, while older children and strong adults may not only endure cold, but may even thrive in it. The fresh air or outside air treatment of pneumonia is subject to the modification of common sense. If a patient's body and extremities become cold or chilled when properly covered, the fresh air treatment is too severe.

3. *Diet.*—The food of the patient should represent something of all the elements required for nutrition. This means protein in the form of eggs, meat juices, properly made meat broths, and milk. The eggs may be in any form desired, except fried. The milk should never be sufficient in amount to cause intestinal gas, or gastric indigestion.

The next very necessary element for nutrition is starch, and it should not be forgotten that many a seriously ill patient finally dies really of acidemia from carbohydrate starvation. Egg albumin and milk do not represent the proper food for patients who are ill more than a few days. The starches can be presented in cereal gruels, rice, oatmeal, malted milk, toast, crackers, and even by potato soup. Ice cream, custard, chocolate, and a small amount of cane sugar or milk sugar are all of value.

The patient should be allowed plenty of water, as, however valuable a deprivation of water may be in aborting an acute cold or acute bronchitis, it is not advisable to withhold water in pneumonia. Unless there are edemas from a failing heart or from kidney insufficiency, plenty of water will increase the amount of urine and therefore remove more products of waste metabolism from the blood, thus tending to prevent the toxemia from the disease which is to be feared. It promotes the secretion of the skin, which is desirable, and also renders the exudate in the lungs less tenacious and more easy of expectoration.

Elements of nutrition which must not be forgotten are: sodium chlorid, iron when meat juices are not given, and lime when little milk is given, and especially if there is much blood in the expectoration. The sodium chlorid can be given by properly salting the patient's food, especially his gruels, and even at times his milk. The iron may be given as a saccharated oxid of iron (*Eisenzucker*) 3-grain tablet, crushed at the time of taking, or crushed by the patient's teeth, and administered twice a day. The lime may be given as lime water in tablespoonful doses in milk or in water, three or four times in twenty-four hours; or it may be given in a capsule as calcium glycerophosphate, in 0.30 gm. doses.

The whole question of the diet is also subject to common-sense modification to fit the patient. There are enough suggestions in the foregoing to furnish sufficient nutrition while meeting almost any patient's desires. The main object is (1) to avoid starving the patient on any element that he requires to promote his metabolism and keep up his nutrition; and (2) to avoid gastric and intestinal indigestion. If the tongue is heavily coated and the patient is so seriously ill that he does not digest properly, 5 drops of dilute hydrochloric acid in water, directly after his protein meals, will aid the stomach digestion and often clean the tongue. It may also stimulate intestinal digestion. If there is much intestinal gas the diet should be closely studied by the physician to ascertain which food is causing it. Provided that the blood-pressure is not too high, that the heart is not too irritable, and that the patient is not too nervous and restless, coffee morning and noon, or coffee in the morning and tea at noon, or tea both times if the patient prefers, is advisable and often beneficial. Tea and coffee should be considered as representing caffein, and if the action of caffein is desirable, these beverages may be given. They should not be given in the late afternoon or evening, as they tend to prevent much needed sleep.

*(To be continued)*

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SATURDAY, OCTOBER 23, 1915

## OBESITY AND STARVATION

The essence of the successful method for reducing weight in those suffering from obesity lies in keeping the intake of energy below that of the output. Theoretically, complete fasting constitutes the most prompt method of accomplishing the end sought. It is a well-recognized fact, however, that starvation prolonged over a period of more than a few days, either voluntarily or as an incident of disease, may lead to unpleasant symptoms. Headache, nausea and dizziness portend the existence of conditions that are not exactly normal, and frequently they can be made to disappear promptly by the ingestion of even a little food. Most modern "treatments" for obesity, therefore, consist in underfeeding rather than complete fasting, particular care being directed to conserving the protein of the body so that the reduction in weight shall represent essentially a loss of body fat oxidized to furnish energy to the underfed individual.

In the course of observations on the voluntary fasting of two exceptionally obese patients of the Massachusetts General Hospital in Boston, Folin and Denis[1] noted the usual development of the indications of "acidosis," that is, an increased elimination of acetone, aceto-acetic acid, and particularly of beta-oxybutyric acid and ammonia in the urine. In one of the subjects the figures were exceptionally high, amounting to over 18 grams of beta-oxybutyric acid and no less than 2.5 grams of ammonia-nitrogen during the fourth day of starvation. The appearance of such products in these amounts is in accord with the widespread scientific belief that the "acetone bodies" are derived chiefly from incompletely oxidized fat. When the obese are compelled to depend on their store of fat for maintenance, one might reasonably expect these intermediary products to "crop out."

In order to relieve the subjective symptoms associated with this fasting acidosis, Folin and Denis interrupted the period of complete starvation by a period of very moderate diet just sufficient to cause the disappearance of the "acetone bodies" from the urine. Thereupon a second fast was begun. Here the striking observation was made that the acidosis did not manifest itself anew until the third day of this fast, and the patient felt well until the fourth day. After an interspersed repetition of "low" diet a third fast was begun five days later. Here again the onset of acidosis was even slower than during the second period. These facts, supported by confirmatory evidence in a similar case, have suggested to the observers that with regard to the complete oxidation of body fat in starvation, the human organism is capable of at least a certain amount of adaptation, and that it is this individual factor rather than the tendency to obesity or the extent of the fat deposits in the body which chiefly determine the onset and the degree of acidosis. Folin and Denis conclude that one of the effects of repeated fastings is habituation to the complete oxidation of mobilized body fat, and a consequent retardation of the development of acidosis.

These results suggest, in the words of their discoverers, that one perfectly safe, rapid and effective method of reducing the weight of very obese persons is by a series of repeated fasts of increasing duration, the ammonia or beta-oxybutyric acid determination being used as a guide to the length of each fast.

1. Folin, Otto, and Denis, Willey: On Starvation and Obesity, with Special Reference to Obesity, Jour. Biol. Chem., 1915, xxi, 183.

## THE RHYTHM OF THE HEART

During recent years there has been such extraordinary progress in our knowledge of the rhythm of the heart and its disturbances in disease and under the influence of drugs that probably many physicians have rather hazy ideas as to the present status of knowledge on these subjects. Progress in this field has resulted from the development of methods which have enabled clinicians to apply to the human heart some of the knowledge already available in regard to the heart of the lower animals. On the other hand, the clinical application of these methods has revealed many hitherto unsuspected conditions and raised new questions in physiology, pathology and anatomy; this has greatly stimulated further investigation along these lines. The result has been greater progress within the last few years than in as many decades previously. In this work anatomists, physiologists, pathologists, pharmacologists and clinicians have all had a part. Nor has the work been confined to one country: the Dutch (notably Einthoven), the English (Mackenzie, Keith, Lewis and Cushny for example), the Germans and Austrians (His, Hering, Wenckebach, Rothberger and Winterberg and others), Americans (Erlanger, Cohn, Eyster and Meek, to mention only a few) as well as representatives of many other nationalities have made important contributions.

The two methods which have contributed most to the solution of problems concerning the disturbances of rhythm in the human heart have been the use of

venous tracings and of the electrocardiograph.[1] Both of these methods show whether or not each beat of the ventricle is preceded by one of the auricle; they show accurately the interval of time elapsing between the auricular and the ventricular contractions; in cases of abnormal or disturbed rhythms they throw much light on the point of origin of such rhythms.

Among the numerous points established by these investigations (combined with and controlled by experiments on the hearts of the lower animals) the following may be mentioned: Normally each heart beat begins in a small area of the right auricle beginning between the opening of the superior vena cava and the auricular appendix and extending toward the inferior vena cava; that is, in, or in the region of the specialized tissue known as the sinus or sino-auricular node. From this point the wave of excitation passes over the auricles causing the auricular contractions; it passes through the auriculoventricular bundle of specialized tissue (the bundle of His) to the ventricles, which contract at a definite and measurable interval after the auricular contraction. This constitutes the normal or sinus rhythm of the heart. If, however, for some reason this sinus region ceases to inaugurate impulses, or if the impulses are comparatively weak, or if they fail to reach other parts of the heart, then one or more of the latter may assume this function of "pace maker." One of the most important of the regions which may inaugurate a rhythm for the heart is the auriculoventricular node, which lies in the interauricular septum at the beginning of the auriculoventricular bundle. Impulses arising in this region reach the auricles and ventricles simultaneously or almost simultaneously, and the chambers of the heart contract at the same time; in other words, an auriculoventricular rhythm replaces the normal sinus rhythm. Or the impulse may arise still lower in the auriculoventricular bundle; thus, apparently, it may arise now in the branch passing to the right, now in that passing to the left ventricle. Many other forms of irregular rhythm, which it is impossible to consider here, have been described.

Other disturbances of rhythm result when some or all of the auricular beats fail to reach the ventricle; in other words, when there is a partial or complete "heart block." Heart block, as is now quite generally known, may result from an anatomic interruption of the connection between the auricles and ventricles, as is often the case in the Adams-Stokes syndrome; or the interruption may be only functional. In either case the ventricles develop a rhythm of their own more or less independent of that of the auricles. Functional heart block may result from increased activity of the vagi. It has long been known from experiments with animals that one effect of stimulation of the vagi is a lowering of the ability of the tissue connecting auricles and ventricles to conduct impulses from the former to the latter. Similar results may be obtained in man by pressure on one vagus, or the vagus may be thrown into increased activity reflexly, by pressure on the eyeball for example.[2] Digitalis increases the activity of the vagus center; one of the consequences is impaired conduction of impulses from auricle to ventricle and the well known condition of heart block so often occurring in the use of this drug. In auricular fibrillation, a condition which occurs in very many cases of valvular heart disease and in which the normal auricular beat is replaced by a condition of fibrillation in which many hundreds of impulses per minute endeavor to reach the ventricle, digitalis, by increasing the resistance of the auriculoventricular bundle, and so reducing the number of impulses reaching the ventricles, protects and slows the latter. This is the generally accepted view of the action of digitalis in this condition, although some details of this explanation have been questioned. Or digitalis may, apparently, cause a condition of block in lower portions of the auriculoventricular bundle leading to marked changes in the character of the beat of one or other of the ventricles.[3]

Perhaps the foregoing comments will suffice to show that, although this recent work may at first thought appear to add to the complexity of an already complex subject, it in reality tends to simplify the entire subject by bringing various phenomena under a common viewpoint. It represents the stage of synthesis which always follows a more thorough study of natural phenomena.

1. Electrocardiography, Miscellany, THE JOURNAL A. M. A., Oct. 2, 1915, p. 1208.

2. See, for example, Levine, S. A.: The Oculocardiac Reflex, Arch. Int. Med., May, 1915, p. 758.

3. Cases apparently of this character were reported, and the literature reviewed, by H. A. Christian (Arch. Int. Med., Sept. 15, 1915, p. 341).

4. The Changing Theories of Diabetes, editorial, THE JOURNAL A. M. A., Aug. 2, 1913, p. 348; Two Theories of Diabetes, March 28, 1914, p. 1023.

## DIETOTHERAPY IN DIABETES

It must be frankly admitted that the underlying nature of diabetes is still veiled in deep mystery. The number of individual important facts now known in regard to the disease is large. The earliest knowledge of the attending glucosuria has been supplemented by information about the condition of the blood — the hyperglycemia of diabetes — and by such investigations as have demonstrated beyond question that the capacity of the organism to destroy sugar is impaired.[4] Other details of the perversions of metabolism, such as the acidosis and ketonuria, have been brought to light. Drug therapy has largely been abandoned, and dietotherapy substituted for it. One who has followed the progress in the study of diabetes can understand the occasions for the successive changes in the proposed dietetic measures, which include all gradations of regimen from starvation or

strictly carbohydrate-free dietaries, on the one hand, to the oatmeal or potato "treatments" at the other extreme. As an expert in this field recently remarked, physicians may well come to the conclusion, after reading some of the latest literature in this field, that all of our earlier views have been turned topsyturvy.

An intelligent appreciation of the situation calls for a brief historical survey. The earliest attempts of the more modern procedure in the dietary management of diabetes aimed at overcoming the excretion of sugar, or reducing it to a minimum by restricting the intake of carbohydrate and, if need be, likewise that of protein, which was recognized as an added source of sugar in severe cases. This method of treatment met its difficulties in the appearance of ketonuria, with the attendant dangers of acidosis, leading to the dreaded coma. Nothing short of the administration of some carbohydrate seemed to avert this incidental feature of the severer types of the disease. It was at this period that certain special dietary schemes were attempted, such as the milk, rice and potato diets, respectively. Levulose was recommended as a carbohydrate toward which the diabetic shows special tolerance. None of these proposed devices for furnishing carbohydrate in some way more acceptable to the diabetic organism gained more than passing consideration. As a rule, they offered no advantage in treatment.

Through chance observations, von Noorden hit on the routine oatmeal treatment. In certain cases in which the patients were put on an exclusive diet of oatmeal, owing to digestive disturbances which they were subject to, von Noorden noticed that instead of an expected increase in sugar output, this actually decreased. Repeated similar favorable increases of tolerance led to the publication of the facts. The new mode of dietetic management, in which the administration of large quantities of oatmeal and butter for a few days is made to follow a few days of "strict" diet or so-called "vegetable" diet familiar to all dietotherapeutists, promptly called forth protest. Prominent investigators like Naunyn and Pavy denied the possibility of cure by feeding starchy cereals. Naunyn and his pupils attempted to explain the utilization data of the oatmeal administrations by the contention that the cereal carbohydrate becomes peculiarly prone to fermentative decomposition in the alimentary tract. It is destroyed without significant utilization, we were assured.

Despite its theoretical incompatibility and the outspoken criticism of well-known writers, the oatmeal treatment for certain types of diabetics has not been abandoned. From time to time, groups of successful cases have been reported by competent, unbiased clinicians. Every one who has achieved any success with the procedure has emphasized that a suitable preliminary strict regimen is indispensable to success, and also that the scheme fails in many instances. The striking character of some of the statistics, which show greatly improved tolerance after a few days of the oatmeal diet, as well as the character of the names attached to the reports, leaves the impression that some element of merit is hidden in the observations. The attempts at explanation have not been fortunate. At first it was believed that some specific chemical constituent of oatmeal other than starch is responsible for the increased carbohydrate tolerance and the amelioration of the ketonuria. This now seems unlikely. It was believed that oatmeal components might either act on the ductless gland mechanism in some undiscovered way, or render the kidneys less permeable to sugar. The more recent analyses of the blood-sugar content have withdrawn any probability of the latter explanation. Additional explanations need not be advanced here.

The supposed specificity of oatmeal in its favorable effect on the diabetic was gradually dispelled by the demonstrations, not very convincing at first, but more emphatic as the technic became more consistent, that other cereal products could be substituted with success. Blum, Petersen, Lampé, Klemperer and others have reported the occasional favorable use of a variety of natural products other than those derived from the oat seed. The list is not inconsiderable. In every case, however, emphasis appears to have been put on the necessity of restricting the carbohydrate intake to a single plant source, whether it be oat, wheat, buckwheat or a legume.

Falta[5] of Vienna now assures us that "mixed" carbohydrate treatment may equal the older procedures in its favorable influence on glucosuria and ketonuria. This extends the palatability of the diet in those cases in which this form of diabetic regimen is to be tried. As a rule it seems to be best to use the cereals in the form of gruels or porridges — not in a baked product — the reason presumably being connected with the different alimentary behavior of the two types of food product. Like the advocates of the oatmeal treatment, Falta insists that meat and protein from animal sources should be excluded, and plant protein substituted. The explanation for this is not clear. The contention is made that meat in largest degree interferes with the glucogenesis of the diabetic organism.

It should be borne in mind that these "cereal treatments" are not in the nature of permanent diets, but are merely interspersed in the midst of a fairly strict routine of carbohydrate-free living. This fact has not always been understood by practitioners. Highly advocated tentative dietary methods, whether they involve starvation and alcohol or mixed cereals, deserve intelligent consideration and trial under appropriate conditions. They must not, however, be allowed to over-

5. Falta, W.: Zur Theorie und Behandlung des Diabetes mellitus, Med. Klinik, 1914, No. 1; Ueber die gemischte Amylazeenkur bei Diabetes mellitus, München. med. Wchnschr., 1914, No. 22, p. 1218.

shadow the success of the current methods of diabetic dietotherapy, particularly in cases of only moderate severity; nor should they be permitted to furnish an argument for the unscrupulous vender of diabetic foods which are rich in starch, even though the label may be "within the law."

## GOOD HEALTH COMMERCIALLY CONSIDERED

The final report of the Commission on Industrial Relations, created by act of Congress in 1912, has just been issued. While the findings and recommendations of this commission on labor conditions, industrial unrest, workmen's compensation, hours of labor, trade unions and other subjects connected with industrial conditions are of interest, the most important section of the report, from the standpoint of the physician and the sanitarian, is Section 16 on Industrial Conditions and the Public Health. Condensed into six pages are a number of startling statements for the first time given the authority and endorsement of a government commission. Under the direction of an officer of the Public Health Service, investigations were conducted by the commission which revealed the fact that while much attention has been given of late to accident prevention, yet accidents caused only one seventh as much destitution as does sickness. Each of the thirty-odd million wage earners in the United States loses an average of nine days a year through sickness, at an average cost of two dollars a day. The wage loss from this source is over five hundred million, while the added cost of medical care of at least $180,000,000 increases the total sick bill of the wage earners of the United States to $680,000,000 a year. From 30 to 40 per cent. of cases requiring charitable relief are due to sickness, while sickness among wage earners is primarily the result of poverty, causing insufficient diet, bad housing, inadequate clothing and unfavorable surroundings in the home. According to the commission, the surroundings and place of work and the personal habits of the worker are important but secondary factors. This means that while there should be no diminution in our efforts to secure better conditions in the factory, the office and the workship, the real solution of the public health problem lies in the improvement of the home.

Quite as important is the classification made by the commission of disease-causing conditions into three general groups: those for which the employer and the character of the occupation are responsible; those for which the public is responsible, and those for which the individual worker and his family are responsible. It has become a truism in public health work that fixing the responsibility definitely and beyond question is half of the battle for better conditions. The commission regards the employer as responsible for occupational diseases, low wages, excessive hours, work methods causing nervous strain and general insanitary conditions. The public is responsible for housing, water supply, food, drugs and community sanitation. The greatest share of responsibility, however, rests on the individual and, under present conditions, in the opinion of the commission, he is unable to meet this responsibility. The majority of wage earners do not receive sufficient wages to provide for proper living conditions. The present methods of disease prevention and cure are expensive, and sickness is most prevalent among those who are least able to purchase health. The commission does not anticipate any such rapid increase in the wages of all classes of workers as would permit proper living conditions and adequate medical attention, and therefore concludes that new methods of dealing with existing conditions must be adopted, based on the cooperative action of those responsible for these conditions. A system of sickness insurance is proposed as the most feasible single remedy. The right of the federal government to tax industries in a sickness insurance system has been recognized since 1798, when the law taxing registered vessels for the support of the Marine Hospital Service was passed.

An extensive scheme for a federal system of sickness insurance is outlined by the commission providing for a national sickness insurance commission composed of representatives of employers and employees in equal ratio, with the federal commissioner of labor statistics and the surgeon-general of the Public Health Service as ex officio members. It is interesting and encouraging to note, among the most important recommendations of the commission in this direction, that "correlation of the insurance system with the medical profession, the lack of which has been a serious defect in German and British systems, is absolutely necessary." Any one who has followed the development of industrial insurance abroad will admit that the opposition or at least the half-hearted cooperation of the medical profession, owing to the inequitable system of compensation and to the fact that no consideration was given to the medical profession in framing the various insurance schemes, has been a most important factor in the partial failure of these insurance systems. A trained medical profession is absolutely essential for the successful operation of any industrial insurance plan. The terms on which physicians are asked to assist in the operation of such a system should be fair and such as will enable them to do justice to their responsibilities. This has not been true either in England or in Germany. More than this the physician does not ask. Less than this he should not be expected to accept. The recommendations of the commission on sickness insurance and on the improvement of health conditions among wage earners are worthy of the most careful consideration both by employers and by labor unions.

## THE OCCURRENCE OF CREATININ IN PLANT PRODUCTS

Physiologists ordinarily associate creatin and creatinin with animal products. Among animal tissues and organs, there is a marked inequality in the distribution of these specific compounds. They preponderate in the muscles to an extent which makes the other sources seem quite inconsiderable. For example, recent analyses by Janney and Blatherwick[1] give comparative figures in one species as follows, in terms of milligrams per hundred grams of organ: muscle, 470; brain, 114; testes, 181; pancreas, 18; liver, 20; kidney, 14; spleen, 30. Even among animal species, the occurrence of creatin in muscle is not an invariable feature, for it is entirely wanting in the contractile tissues of invertebrates, such as the shellfish which we eat.

For some time the creatinin output in the urine has been looked on as an index, in some degree, of the endogenous metabolism of vertebrates, and of man in particular. In order to estimate this factor, it is, of course, essential that the diet shall be free from creatin and creatinin, which may reappear in the kidney output as products of exogenous origin. Accordingly, it has been customary to secure the appropriate dietary for estimations of endogenous creatinin output by excluding meat and other animal tissues from the ration. Vegetarianism has been assumed to furnish the appropriate diet here required.

Though much has been written on the relations of creatin and its derivatives or precursors to animal tissues and processes in biochemistry, the possibility of its occurrence outside of the animal kingdom has not been considered to any great extent until recently. Shorey[2] found creatinin in extracts of soils. The interpretation of this discovery was not easy, owing to the fact that the formation of creatinin in bacterial cultures in peptone mediums had previously been reported. It might, therefore, owe its origin to the agency of soil bacteria acting on nutrient products in the earth used. Sullivan[3] has called attention to the fact that most commercial nutrient "peptone" is of animal origin and may contain antecedent products which readily yield creatinin. He has, however, demonstrated that a trace of soil added to protein-free synthetic culture mediums may still give evidence of the formation of creatinin by micro-organisms.

The possibility that plants may furnish the creatinin found in soils was realized by Sullivan,[4] who found it in the vegetable kingdom for the first time in 1911. He detected it in wheat seeds and seedlings, in rye, clover and alfalfa seeds, in mature cowpea plants and in potato tubers. From the fact that creatinin was present in larger proportions in recently cropped soils, it was assumed that the presence of creatinin there is associated in some way with plant growth.

Quantitative data have recently been furnished by Sullivan.[5] Only a few parts of creatinin per million were found in the ungerminated seed of wheat and soy bean; but during germination the quantity may increase up to 65 parts per million. Japanese investigators have reported the presence of creatinin likewise in the seeds of the Adzuki bean, the kidney bean, the horse bean and green peas, and have identified the product by dependable isolation methods.[6] As has happened before in physiology, these facts serve to indicate that the relationships between animals and plants in respect to fundamental biochemical processes are closer than it was customary to believe before the advent of modern chemical investigations. From the standpoint of their bearing on diet problems, the quantities of creatinin in plants are probably far too small to command much attention. A growing knowledge of how it arises and what becomes of it in the plant economy may nevertheless help in the future to throw light on the still vexed questions of creatin-creatinin metabolism in man.

1. Janney, N. W., and Blatherwick, N. R.: The Quantitative Determination of Creatine in Muscle and Other Organs, Jour. Biol. Chem., 1915, xxi, 567.
2. Shorey, E. C.: Science, 1911, xxxiii, 340.
3. Sullivan, M. X.: The Formation of Creatinine by Bacteria, Science, 1915, xlii, 69.
4. Sullivan, M. X.: Jour. Am. Chem. Soc., 1911, xxxiii, 2035.
5. Sullivan, M. X.: The Amount of Creatinine in Plants, Science, 1915, xlii, 69.
6. Oshima, K., and Ariizumi, M.: On the Occurrence of Creatinin in Leguminous Seeds, Jour. Coll. Agric., Sapporo, 1914, vi, 17.

## Current Comment

### A THERAPEUTIC ABSURDITY

In the Propaganda department of this issue is another report of the Council on Pharmacy and Chemistry on the widely advertised products—"Lactopeptine" and "Elixir Lactopeptine." These preparations are supposed to contain, as their two main ingredients, pepsin and pancreatin and this, in the light of present-day knowledge, brands these products — especially the elixir — as therapeutic absurdities. It is axiomatic that pepsin and pancreatin are never indicated at one and the same time and it is practically impossible for the two substances to act together; in fact, in a liquid medium the ingredients are mutually destructive. Eight years ago THE JOURNAL published the results of an investigation showing that Lactopeptine contained "but small amounts of pepsin," and "neither diastase nor pancreatin"; two years ago another report was published confirming the earlier one. The present report still further clinches the previous findings. It is worthy of note that the manufacturers in protesting against this report have uttered not a word in defense of the "Elixir Lactopeptine," although, in probably nine out of ten prescriptions for Lactopeptine, it is the elixir that is called for. The reason for ignoring their most widely used product is evident—Elixir Lactopeptine is an indefensible therapeutic and pharmacologic absurdity. The company in its protest, however, does claim that tryptic activity can be found in fresh specimens of Lactopeptine pow-

der and Lactopeptine tablets. Further investigation, made after this protest was received, showed that while a few specimens of Lactopeptine in the dry form possessed some—therapeutically negligible—tryptic activity, there was no activity whatever in most of the specimens examined. Briefly, the facts regarding this "ethical proprietary" may be summed up thus: (1) Lactopeptine, whether in the form of an elixir, powder or tablets, is a therapeutic absurdity. (2) Lactopeptine in the dry form (powder or tablets) may, when strictly fresh, possess some slight—although therapeutically negligible—tryptic activity, a fact that is of merely academic interest because pepsin and pancreatin are never indicated at the same time. (3) Even if fresh specimens have any advantage over the old, there is no way of telling which the patient is likely to get, as the trade packages of Lactopeptine are undated. (4) The form in which Lactopeptine is usually prescribed is the "Elixir," a liquid preparation in which the pancreatin and pepsin destroy each other. (5) Lactopeptine has not the composition claimed for it and if it did have, it would still be of no value.

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## THE N. F. IMITATION OF ELIXIR LACTOPEPTINE

Nearly forty years ago — to be exact, in 1876 — the essential worthlessness of Lactopeptine was brought to the attention of the pharmaceutical profession. This was done in a paper, contributed to the American Pharmaceutical Association by Prof. Emil Scheffer, reporting some experiments made with Lactopeptine and proving that it had no greater digestive value than the saccharated pepsin then in vogue. This paper, which appeared in the Proceedings of the American Pharmaceutical Association, was called to the attention of THE JOURNAL'S readers by the president of the American Pharmaceutical Association[1] soon after the appearance of the Council's first report on Lactopeptine.[2] When scientific fact runs counter to popular fancy, and especially when popular fancy is supported by heavy advertising, science inevitably gets the worst of it. This is what occurred in the Lactopeptine matter, for Professor Scheffer's paper was ignored by pharmacists and was not brought to the attention of physicians. Not only did an extensive advertising campaign force Lactopeptine and Elixir Lactopeptine into popular favor, but the very demand thus created was an inducement for druggists to imitate the products. As a result, we find the Compound Powder of Pepsin and also Compound Digestive Elixir in the National Formulary. Compound Digestive Elixir, as manifestly worthless as its prototype, Elixir Lactopeptine, has, like its prototype, proved to be a "good seller." It is not surprising to find a journal devoted to the business rather than the professional side of pharmacy (*N. A. R. D. Journal*) earnestly defending the Compound Digestive Elixir on the ground that "physicians keep right on prescribing it, and they say they get the results they are looking for, and what more does any one want?" Even more naively the *N. A. R. D. Journal* goes on to argue that "while the action of one or more of the ingredients in the N. F. formula may be 'killed,' as some writers have expressed it, and that, therefore, the presence of such is superfluous, it has never been mentioned what the resulting compound will be, nor what its therapeutic action." Thus the druggist is invited to emulate the followers of Mrs. Eddy in substituting for inconvenient knowledge a cheerful faith which seeks not to dissolve a profitable mystery. Pharmacists should not be too severely blamed, however, for adopting such an attitude; manufacturers and dealers in drugs are, after all, merchants, whose profits are in a general way directly proportionate to the amount of goods they sell. The pharmaceutical profession, however, will do well to remember that pharmacists themselves will suffer in the end from the reaction in the minds of the medical profession and the public if they persist in disregarding what they know to be true for the sake of what they find to be profitable.

1. THE JOURNAL A. M. A., April 6, 1907, p. 1198.
2. THE JOURNAL A. M. A., March 16, 1907, p. 959.

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## ALABAMA OPTOMETRY BILL VETOED

During its recent session, the Alabama legislature passed a law providing for a board of optometry examiners. The opposition was largely disarmed, owing to the fact that, at the last meeting of the medical society of the state of Alabama, through a general misunderstanding, this bill was recorded as receiving the endorsement of the state association. When it went to Governor Henderson, the facts regarding the measure and its dangers to the public were placed before him, and in spite of considerable pressure he wisely refused to permit it to become a law. Usually the advocates of these measures are able to secure a considerable amount of political backing and influence. The endorsement of the state association, however secured or through whatever misunderstanding it may have occurred, only increased the difficulty of the governor's position. Probably most state executives under these circumstances would have felt fully justified in signing the bill. These facts only increase the appreciation of Governor Henderson's independence and courage in refusing to allow this measure to become a law. In the ten years in which this question has been before legislatures, some definite principles thereon have been evolved. Beyond question, the public is in danger of being imposed on and injured by dishonest or incompetent spectacle fitters. Unquestionably, if in the opinion of the legislature this is a question of sufficient importance to demand regulation, there should be adequate regulation of those who follow this business. It is true that too little time is given to the instruction of medical students on this subject, and that to become a competent oculist or ophthalmologist requires postgraduate instruction. These facts have all been taken advantage of in promoting the passage of optometry bills in the various states. But it does not follow that the only remedy or best remedy is the creation of a separate, independent board of "optometrists" and the legal recognition of a pseudoscientific sect, which, by its incompetent encroachment on the field of medical practice, will do quite as much, if not more, harm to the public than the unregulated spectacle

fitter. Each of our states has a state board for the examination and licensing of physicians. A bill extending the powers of the medical examining board, authorizing it to examine, either directly or through an appropriately constituted examining committee, those desiring to fit glasses, to issue to them a proper license to do so and to prevent all unlicensed persons from preying on the public, would meet all the indications as far as public safety is concerned, and would avoid the evils and dangers of a separate board.

## "CARDUI: THE STORY OF A NOSTRUM"

Those who have followed THE JOURNAL'S articles on "Wine of Cardui" and are conversant with the fact that the suits resulting from the exposures have resolved themselves into a fight by the combined "patent medicine" interests of the country against the American Medical Association will read with interest an article that appears in the current (October 23) issue of *Harper's Weekly*. This article, under the title quoted above, is announced as the first of three to appear in *Harper's* on the subject of "Wine of Cardui" and "Black Draught," two nostrums put out by the Chattanooga Medicine Company. These articles are written by a Dr. Bicknell, who is said to have been in the employ of the Chattanooga Medicine Company for some years as their chemist. Certainly the details he gives indicate a familiarity with the business that could be expected only from one who had been employed in some such capacity. The current article traces the growth of the Wine of Cardui business, and illustrations are used to show the evolution of the nostrum label from "Nature's Great Emmenagogue" to "20 Per Cent. Alcohol." While the author denies that the Chattanooga Medicine Company's nostrum will perform the many wonders claimed for it by its manufacturers, he says "there is one miracle that Cardui can perform—a miracle quite as wonderful, perhaps, as the regulation of the menstrual function; it can make money." According to Bicknell, Wine of Cardui contains blessed thistle and an insignificant amount of black haw. These herbs, says the author, "whatever their life-giving potentialities, are at least conveniently inexpensive." Then follows a computation of the cost of making and marketing a gallon of Wine of Cardui. This shows that the contents of each bottle "cost a trifle over 4 cents." For the bottle, corks, labels, carton, packing case, etc., he computes an amount that makes the cost of a bottle of Wine of Cardui, packed ready for shipment, total a little less than eleven cents. To this he adds the "patent medicine" maker's largest item of expense, advertising, bringing up the total gross cost of the nostrum to a trifle under 26 cents a bottle. It sells for $1.00 a bottle. These statements prepare one for the claim made by Dr. Bicknell that during the past year "the *net profit* of the year's sale of Cardui amounted to $949,200.00!" These figures are enlightening. They help one to understand the lavish expenditure of money that followed the filing of the suits by the Chattanooga Medicine Company against THE JOURNAL and its editor. Those engaged in a business whose *net* profits were even one-half million dollars annually are not likely to be over particular in the methods of defending the business. The fact that the two and a half million dollars, representing the gross sales, based on the Bicknell figures, comes out of the pockets of those who can least afford it, is but an incident in a sordid business.

## THE DEATH OF A GREAT NATURALIST

Henri Fabre has just died at his home in France. Only toward the close of his long, laborious life had the careless world begun to realize that in this unpretentious son of peasants, waging a heartbreaking struggle against grinding poverty and humiliating neglect, it had been ignoring a unique genius. For this long failure to obtain fitting recognition there were many reasons. Fabre possessed none of the arts of the self-advertiser. Entomology, when he embraced it as a career, was a neglected science, and the phase of it to which he intuitively turned, the study of instinct, was especially neglected. Then, too, though versed in several sciences, Fabre was impatient of booklore in his own field and refused to bow to the theories of the day, preferring to interrogate Nature alone. Finally, it may be that even his delightful prose, with flashes of fancy and quaint humor, inspired in the Gradgrinds of science a certain distrust. This distrust, if it existed, Fabre was at no pains to allay, for he declared that he hated the barbarous jargon which made science so thorny and repellant to the young. In his youth Fabre felt a strong inclination toward medicine. Had he followed that inclination, he surely would have made notable contributions to medical science. As Legros says, he had in high degree "that gift, properly speaking poetic, which is known as the clinical eye, which at the first glance perceives and confirms the diagnosis in all its detail." He also had the gift of untiring observation, the thirst for knowledge, the capacity for unlimited work and the illuminating imagination which mark the scientific discoverer. Yet we can scarcely reproach the fate which gave his faculties their own peculiar trend. Darwin styled him "the inimitable observer"; Maeterlinck called him "one of the most profound and inventive scholars . . . one of the purest writers, and . . . one of the finest poets of the century that is just past"; Edmond Rostand characterized him as "this great scientist, who thinks as a philosopher, sees as an artist, and feels and expresses himself as a poet."

## A JOURNAL OF LABORATORY MEDICINE

The *Journal of Laboratory and Clinical Medicine* is a new venture in the field of medical journalism. As the title indicates, the journal is to be devoted to the laboratory in its relation to medicine and surgery. Its object is to publish reports of recent discoveries made in research institutions, and to suggest to the practitioner how he may apply these discoveries in his daily work. The first function is to be fulfilled by original contributions, the second by editorials contributed by the editorial staff; several pages are also to be devoted to laboratory methods. Dr. Victor C.

Vaughan is the editor-in-chief, and the associate editors are: Drs. Dennis E. Jackson, St. Louis; Frederick P. Gay, San Francisco; Hans Zinsser, New York; Paul G. Woolley, Cincinnati; J. J. R. MacLeod, Cleveland; Roy G. Pearce, Chicago, and Roger S. Morris, Cincinnati. The journal takes advertising, but makes the following announcement: "The advertising policy of the journal will conform to the standard set by the Council on Pharmacy and Chemistry of the American Medical Association." Among the contributors to the first number are: Drs. Dennis E. Jackson, St. Louis; Frederick P. Gay, San Francisco; George Dock, St. Louis; Roger S. Morris, Cincinnati; Martin E. Engman, St. Louis; Louis B. Wilson, Rochester, Minn., and Paul G. Woolley, Cincinnati. The first number is creditable to all concerned.

## Medical News

(PHYSICIANS WILL CONFER A FAVOR BY SENDING FOR THIS DEPARTMENT ITEMS OF NEWS OF MORE OR LESS GENERAL INTEREST; SUCH AS RELATE TO SOCIETY ACTIVITIES, NEW HOSPITALS, EDUCATION, PUBLIC HEALTH, ETC.)

### ARKANSAS

**Staff Physicians Appointed.**—The boards of control of the state charitable institutions, on September 23, elected Dr. William T. McCurry, Little Rock, oculist for the Arkansas Deaf Institute and the Arkansas School for the Blind, Little Rock; Dr. Luther D. Reagan, physician for the School for the Blind, and Dr. Sherman B. Hickman, physician for the Deaf Mutes Institute.

**Free Treatment.**—The Pope County Medical Society at its meeting in Russellville, October 6, held a series of free clinics.——Plans are under way for the three-story hospital and clinic building to be erected in the rear of the Medical College, Little Rock. The hospital is being constructed with the $20,000 and interest of the Dr. Isaac Folsom Free Clinic Fund founded about fifteen years ago.

### CALIFORNIA

**State Medical Society Meeting.**—It is announced that the Medical Society of the State of California will hold its annual meeting in Fresno, in April of next year.

**Quack Indicted.**—"Dr." S. R. Chamley, the "Cancer Specialist," is reported to have been indicted by the grand jury in San Francisco, recently, but had disappeared when detectives were sent to arrest him. He is said to have charged a patient $2,300 for an operation for cancer when, as testified by witnesses, he knew the patient had no cancer "but meant to get all the money he could."

**Going After the Irregulars.**—The State Board of Medical Examiners announces that it will start an aggressive campaign in southern California directed particularly against the advertising "quacks" and other individuals who prey on the credulous public. It is intended to eradicate from the southern section of California the flagrant violators of the medical practice act who have heretofore openly defied regulation.

### COLORADO

**Medical Reserve Corps Officers Meet.**—A meeting of all Denver physicians who are on the inactive list of the Medical Reserve Corps of the Army was held October 11 in the office of Dr. William W. Grant, for organization and to study the correspondence courses which have recently been authorized by the war department.

**Personal.**—Dr. William A. Jolley, Boulder, formerly major in the Medical Corps of the Colorado National Guard, who has been in service with the American Red Cross in Belgrade, returns home this month.——The resignation of Dr. William P. Harlow, dean of the medical school of the University of Colorado, Boulder, has been presented to the board of regents.——Dr. Samuel R. McKelvey, Denver, has been appointed secretary and executive officer of the State Board of Health.——Dr. James W. Purcell, Denver, who has been seriously ill for ten months, is reported to be convalescent.

**New State Society Officers.**—At the annual meeting of the Colorado State Medical Society held in Denver, October 5 to 7, under the presidency of Dr. George B. Packard, Denver, the following officers were elected: president, Dr. John R. Espey, Trinidad; vice presidents, Drs. Chauncey E. Tennant, Denver; Jesse U. Sickenberger, Grand Junction; William A. Kickland, Fort Collins, and Henry W. Averill, Evans; councilors, Drs. Will H. Swan, Colorado Springs, second district, and Hampton S. Henderson, Grand Junction, fourth district; delegate to the American Medical Association, Dr. Lewis H. McKinnie, Colorado Springs; and alternate, Dr. George A. Moleen, Denver. Glenwood Springs was selected as the next place of meeting.

### GEORGIA

**Dinner to Dr. Murray.**—In honor of Dr. George S. Murray, Columbus, who left September 23 to serve in the Medical Corps of the British Army at the front, the Muscogee Medical Society gave a dinner, September 21.

**Battey Bust Presented.**—A marble bust to the late Dr. Robert Battey, Rome, was presented to the Wesley Memorial Building of Emory University by Mrs. Martha Smith Battey. The ceremony took place October 15. Dr. George H. Noble, Atlanta, presented the bust on behalf of the family and Bishop Warren A. Candler, chancellor of the university, made the address of acceptance.

### ILLINOIS

**State Antituberculosis Meeting.**—The seventh annual meeting of the Illinois Association for the Prevention of Tuberculosis will be held in Danville, October 23, in conjunction with the meeting of the state conference of charities.

**Personal.**—Dr. William Jayne, Springfield, who is still prominent in business life and is a director in the First National Bank, recently celebrated his eighty-ninth birthday anniversary.——Dr. J. H. Riley, DeKalb, is reported to be seriously ill.

#### Chicago

**Needs of Psychopathic Hospital.**—The advisory attending staff of the Psychopathic Hospital, after an investigation of the needs of the institution, recommend that more beds are needed and that the hospital shall be so arranged that patients can be segregated according to their diseases.

**Tuberculosis Expert Gives Clinic.**—Dr. Francis M. Pottenger, Monrovia, Calif., gave a clinic and demonstration in the amphitheater of Rush Medical College, October 16, on "Tuberculosis," under the auspices of the Rush Medical College Ambulatorium of the Chicago Municipal Tuberculosis Sanatorium.

### INDIANA

**Disease Prevention Day.**—The second annual observance of Disease Prevention Day in Indiana, October 1, was a marked success.

**Test Case.**—O. L. Burgener, a chiropractor, is being tried in Indiana for practicing medicine, surgery and obstetrics without a license. The charge was filed by Dr. William T. Gott, Crawfordsville, secretary of the Indiana State Board of Medical Examiners.

**Personal.**—Dr. William N. Wishard, Indianapolis, is reported to be seriously ill with septicemia.——Dr. Edwin W. Poinier, Andrews, has been appointed physician of Huntington County, succeeding Dr. William R. Beck.——Dr. George H. Hockett, Anderson, is recovering after a tonsillectomy.——Dr. David L. Kahn, Indianapolis, has been appointed local surgeon for the Lake Erie and Western Railway, succeeding Dr. Paul F. Robinson, Indianapolis, resigned.——Dr. J. McLean Moulder, Indianapolis, has accepted the superintendency of the new Methodist Hospital, Kansas City, Kan.——Dr. John P. Franz, Indianapolis, was painfully injured in a collision between his automobile and a street car, recently.

### KENTUCKY

**Personal.**—Dr. Granville S. Hanes, Louisville, is seriously ill with septicemia as the result of an infection of the finger. The axillary glands became infected and were removed, October 11.

**Dinner to Dr. Vance.**—A dinner was given to Dr. Ap Morgan Vance by the Medico-Chirurgical Society of Louisville, October 14, at the Tavern Club, to celebrate the election of Dr. Vance to the presidency of the Kentucky State Medical Association.

## MAINE

**Personal.**—Dr. Theodore E. Hardy, Waterville, has had conferred on him the honorary degree of A.M. by Colby University, Waterville.

**New Sanatoriums.**—An order was passed by the governor, September 1, providing for the purchase of the Hebron Sanatorium for Tuberculosis at a cost of $15,000 and for the purchase of the Fairfield Institution, at the same figure. The former institution will be known as the Western Maine Sanatorium, and the latter as the General Maine Sanatorium. ——Dr. Theodore E. Hardy, Waterville, has been elected president of the board of trustees of the state sanatoriums and Dr. Olin S. Pettingil, Wallum Lake, R. I., assistant superintendent of the Rhode Island Sanatorium, has been offered the position of superintendent of the Hebron Institution.

## MARYLAND

**Typhoid in Maryland.**—During the month of September, 609 cases of typhoid fever occurred in Maryland, according to reports made to the State Department of Health. Of these, 186 were reported in Baltimore, the remainder being distributed throughout the counties. Baltimore County leads the list, 68 cases having been reported from there. Of the towns outside of Baltimore, Cumberland had the largest number of cases, 13 being reported. There were 6 cases in Annapolis.

**Surgeons Tell of War Abroad.**—War experiences of Baltimore surgeons in German, French and English hospitals were related recently at the regular meeting of the Baltimore City Medical Society. The subject of the evening was "Medical Lessons of the War." Dr. Henry N. Shaw, Baltimore, stationed in England; Dr. Robert H. Crawford, stationed at the American Red Cross Hospital at Glerwitz, Galicia, and Dr. John A. C. Colston, recently from Pau, France, were among the speakers.

**Cost of Mosquito War.**—The campaign against mosquitoes closed recently. It cost the city of Baltimore about $25,000, and is said to have been successful. William D. Wrightson of the Public Health Service said that the inspecorts had found two kinds of malarial fever mosquitoes in Baltimore, in addition to the ordinary culex, or domestic insect. It is thought that the campaign will be made a part of the work of the health department, which may have a sanitary engineer added to its staff.

**Personal.**—The State Board of Health has appointed Dr. C. Hampson Jones, assistant commissioner of health of Baltimore for nearly twenty years, chief of the bureau of communicable diseases in the State Health Department. Dr. Jones will take charge of the bureau November 1.——Dr. Frank J. Powers, Baltimore, has been appointed by the mayor physician to the city jail, to succeed Dr. George L. Wilkins, who for fifteen years had held this position.——Dr. Nathaniel G. Keirle, chief of the Pasteur department of Mercy Hospital and city medical examiner, passed his eighty-second birthday, October 10.

**Hopkins Extends Work.**—An important branch of the department of pathology in the Johns Hopkins University, to be devoted entirely to research work, will be opened within the next six weeks in the pathologic building, after Dr. William H. Welch returns from China. Dr. Welch is chief pathologist of the university and is now in the Far East on work for the Rockefeller Foundation. The rooms to be occupied in the new work have been equipped with scientific appliances and instruments costing several thousand dollars. A fund aggregating $22,000 has been raised for supporting the work for three years. At the end of this time a larger endowment will be necessary. In the absence of Dr. Welch, Dr. Milton C. Winternitz, his first assistant, has been directing the work. Dr. Welch will probably name the director soon after his return. It is probable that the director of the laboratory will have two assistants. All branches of research work in pathology will be followed. This includes bacteriology, immunology, and problems arising from postmortem examinations.

## MISSOURI

**Personal.**—Dr. William P. Camp, Springfield, is reported to be critically ill at his home.——Dr. D. R. McCue, Trenton, a member of the State Board of Pardons and Paroles, has resigned.——Dr. Leroi Beck, South St. Joseph, was seriously injured by the overturning of his automobile while making an emergency call, September 4.

**Chiropractors Barred.**—The Missouri State Board of Health has ruled that chiropractors have no legal standing and are open to prosecution for practicing as physicians without a license.

**Health Lectures of State Fair.**—At the State Fair, Sedalia, September 25 to October 2, a program of lectures on public health topics was aranged under the auspices of the Missouri State Medical Association and the state commissioner of food and drugs. The program included addresses by Dr. Robert M. Funkhouser, St. Louis, on eugenics; Mr. F. H. Fricke, state pure food and drug commission, on food and drugs; Dr. Robert E. Schlueter, St. Louis, on cancer; Mr. H. E. Wiedeman, state chemist, household tests; Dr. Frank G. Nifong, Columbia, on the economic value of medical science and its service to the world today; Dr. Mazyck P. Ravenel, Columbia, on "Every Man His Own Life Insurance Agent"; Dr. Francis H. Matthews, Liberty, on contagious diseases; Dr. Guy Titsworth, Sedalia, on how to keep the eyes well. Motion pictures on health protection were shown after each lecture.

### St. Louis

**Bartlett's Guests.**—Dr. William J. Mayo, Rochester, Minn.; Dr. Victor C. Vaughan, Ann Arbor, Mich.; Dr. Richard H. Harte, Philadelphia, and Dr. Donald C. Balfour, Rochester, Minn., were guests of Dr. Willard Bartlett on October 11. The visitors were making a trip down the Mississippi River in Dr. Mayo's yacht.

**Biologic Research.**—Note has previously been made of the expedition undertaken under the auspices of St. Louis University for the purpose of establishing a biologic research station in British Honduras. The preliminary survey which was made by Dr. Edward N. Tobey, Dr. John P. Coony and Mr. Alphonse M. Schwitalla was unfortunately saddened by the tragic loss of the United Fruit Company's steamer *Marowijne* with Dr. Tobey on board as has been already reported. As for the results of the expedition, Mr. Schwitalla reports that a detailed program can now be submitted to the university for the prosecution of research in those regions. It is clear that a great abundance of material can be found for studying some of the outstanding problems connected with malaria and uncinariasis. A large amount of material can also be obtained for studying pinta, sprue, climatic bubo, and the so-called "tropical ulcers." In several cases it was suspected that fevers of hitherto undescribed character have been encountered. During this year's trip only the coast towns were visited. The villages of the interior are sure to yield even richer results. Altogether it may be considered as certain that a further study of this promising field will yield results that will be beneficial not only to the people of those regions but will also prove a distinct advance in tropical medicine.

## NEW HAMPSHIRE

**New Officers for State Surgeons.**—At the annual meeting of the New Hampshire Surgical Club, held in Hanover, October 8, Dr. William H. A. Lyons, Manchester, was elected president; Dr. George C. Wilkins, Manchester, vice president, and Dr. Charles E. Congdon, Nashua, secretary-treasurer.

**Dartmouth Alumni Elect.**—At the annual meeting of the Dartmouth Medical Alumni Association held in Hanover, October 8, under the presidency of Dr. Elmer H. Carleton, Hanover, the following officers were elected: president, Dr. Elmer H. Carleton, Hanover (reelected); vice presidents, Drs. Alexander A. Beaton, Franklin, and Walter A. Bartlett, Manchester; and secretary-treasurer, Dr. Howard N. Kingsford, Hanover.

## NEW JERSEY

**Medical Talks to Pupils.**—Arrangements have been made by the board of education of Montclair to have lectures to be given to the pupils of the evening schools of the city on hygiene, first aid, etc.

**State Board Sustained.**—The Supreme Court of New Jersey in a decision rendered Oct. 6, 1915, partially sustained the State Board of Medical Examiners in refusing to license "graduates" of the New Jersey College of Osteopathy in regard to which it was charged that diplomas had been sold at from $25 to $300 each.

**Personal.**—Dr. Edward Guion, for twelve years chief of the Bureau of Health of Atlantic City, has resigned to enter

private practice.——Dr. John C. Felty, first assistant to the medical superintendent of the New Jersey State Hospital for the Insane, Trenton, who has been a member of the medical staff of the hospital for twenty-five years, resigned and relinquished his duties, October 4, and will make his home in Gettysburg, Pa. A dinner was given in honor of Dr. Felty, at the Country Club, October 4, at which he was presented with a clock.——Dr. Edgar B. Funkhouser has succeeded Dr. Felty.

## NEW YORK

**Psychopathic Ward.**—The finance committee of the Buffalo Common Council has recommended that Health Commissioner Francis E. Fronczak be authorized to spend $2,000 in fitting out a ward in the East Ferry Street Hospital, Buffalo, for alcoholics and persons suspected of being of unsound mind.

**Sanatorium Opened.**—The J. N. Adam Memorial Hospital, Perrysburg, was formally opened October 9. This institution has been erected at a cost of $120,000 and is under the charge of the Buffalo Association for the Relief and Control of Tuberculosis. At the opening exercises the work of the schoolchildren of Buffalo, who raised $10,000 for the institution, will be commemorated by the unveiling of tablets.

### New York City

**Correction.**—In the personal items of the issue of October 9, it was stated that Dr. and Mrs. H. Holbrook Curtis had sailed for Europe. Dr. Curtis telegraphs that it is a misstatement.

**"Safety First" Shows Results.**—A report compiled by the Safety First Society states that during September, 1915, there were only twenty-eight deaths from accidents involving vehicles in Manhattan as against forty-nine for the same month of 1914. Motor vehicles of all types killed eighteen persons last month, as against thirty in September, 1914.

**Four Anthrax Cases.**—During the past three weeks there have been four deaths from anthrax in this vicinity. The most recent, that of Mr. Stackpole, has excited much public interest because he was treated with the new serum prepared by A. Eichhorn of the Bureau of Animal Industry and lived for about a week after the disease manifested itself.

**Changes in the Medical Faculty at Columbia.**—Dr. Francis R. Fraser has been granted leave of absence while rendering service with the French army. Dr. Francis Carter Wood has been elected by the medical faculty to be delegate to the university council for the unexpired term of Dr. M. Allen Starr, retired. It is announced by the trustees of the university that the registration in the medical department is 345 as against 323 last year.

**Many Shops Still Sell Wood Alcohol.**—An investigation by the health department of 2,400 places in which it was suspected that wood alcohol was being sold has brought to light the fact that 764 shops were selling wood alcohol not properly labeled. Of these places, 466 were drug stores and saloons and the others were paint shops. The result of the discovery that so many shops were using and selling wood alcohol illegally has caused the health department to issue a warning to citizens against the use of any alcohol that is not properly labeled.

**Health Department Encourages Use of Schick Test.**—The bureau of laboratories of the health department announces that it is prepared to supply an outfit for applying the Schick test which will make the application of the test a simple procedure for the general practitioner. This outfit consists of a capillary tube and a small rubber bulb, such as is employed in the distribution of vaccine virus, and a bottle containing 10 c.c. of sterile physiologic saline solution to which 0.025 per cent. phenol has been added. The capillary tube contains one minimum lethal dose (for the guinea-pig) of undiluted diphtheria toxin. The outfit is accompanied by directions for its use and the health department believes that it will be found both convenient and reliable.

## NORTH CAROLINA

**Dairy Inspection Inaugurated.**—Greensboro is inaugurating a system of dairy inspection including the publication from month to month of the standing of the respective dairies which supply milk to the city.

**Personal.**—Dr. Samuel Westray Battle, Asheville, sailed for England, October 4.——Dr. John Thames, Wilmington, assistant county health officer of New Hanover County, has been completely exonerated on the charge of official negligence, recently preferred against him.

**The Murphy Memorial.**—The P. L. Murphy Memorial Association, of which Colonel P. M. Pearsall, Newbern, is secretary, has issued in book form the addresses made on the occasion of the presentation of the portrait of the late Dr. Patrick Livingston Murphy to the state library, Raleigh, and on the dedication of the bronze memorial tablet to Dr. Murphy at the State Hospital for the Insane, Morganton.

**Deaver in Charlotte.**—Dr. John B. Deaver, Philadelphia, was entertained at luncheon at the Charlotte Sanitarium by Dr. Edward C. Register, September 22, and at dinner by the Mecklenburg County Medical Society at the Country Club in the evening. During the day Dr. Deaver gave clinics at the Charlotte Sanitarium and the Presbyterian and other hospitals of the city. In the evening he delivered a lecture on "Symptoms of Disease in the Upper Abdomen."

**Health Officers Confer.**—The four recently installed whole-time county health officers, Drs. Darius C. Absher of Henderson, Vance County; Milton T. Edgerton of Greenville, Pitt County; James C. Braswell of Nash County and Eugene R. Hardin of Clinton, Sampson County, met at Raleigh, September 18, at the office of the State Board of Health, to arrange uniformity of system and method in the control of infectious diseases in their respective counties.

**Hospital Notes.**—Dr. Addison G. Brenizer, Jr., has leased the old Brenizer Home in Charlotte and will establish a private hospital in the building.——Contracts have been let at Tarboro for the Edgecombe County General Hospital.——Drs. William P. and Charles R. Reaves, Greensboro, are building a three-story and basement building which will be ready in a short time. The basement will be given over to the treatment of colored patients; the first floor will be used for offices and the third floor as an infirmary for white patients.——Miss Lorene Johnson, Statesville, has leased the Billingsley Hospital and will conduct it for the benefit of patients of all physicians of the city and county.

## PENNSYLVANIA

**Personal.**—Dr. Walter J. Cathrall, South Bethlehem, after an illness of eleven months contracted in the United States government service in the Far East, is again able to resume his practice.

**Dedication of Hospital.**—The dedication of the Elizabeth Steel Magee Hospital and the conferring of honorary degrees by the University of Pittsburgh will take place in Memorial Hall, that city, October 27. There will be a number of addresses relating to the hospital and its founder, Christopher Lyman Magee, and an address on "The Teacher's Inheritance" by Dr. William Walter Chipman of Montreal, after which the degrees will be conferred. The new hospital, located at Forbes and Halket streets, will be inspected in the afternoon and there will be a dinner at the Hotel Schenley in the evening.

**Optometrists to Fight.**—The institution of mandamus proceedings to test the legality of Governor Brumbaugh's veto of the house bill creating a separate board for licensing optometrists, was the principal topic of discussion before the annual convention of the optical society of Pennsylvania, which opened its meetings at the Hotel Adelphia, Philadelphia, October 12. Although their reason for fighting the veto is to escape the domination of the state medical board of optometrists, they base their fight on a technicality. It is their contention that the governor vetoed the bill after the ten day limit allowed for vetoes and that the bill, therefore, became law automatically.

### Philadelphia

**Personal.**—Dr. John B. Carnett, who has been seriously ill for four mouths, is convalescing.——Dr. Malcolm C. Grow is now en route to Archangel to serve in a Russian military hospital.——Dr. Luther C. Peter has been made associate professor of diseases of the eye in the Philadelphia Polyclinic.——Dr. William B. Swartley has just gone on service for three months at the American Ambulance Hospital at Paris.——Dr. Charles H. Frazier was elected president of the Mask and Wig Club of the University of Pennsylvania, October 13.——Dr. Daniel J. McCarthy, professor of medical jurisprudence in the University of Pennsylvania, has returned from the American Ambulance Hospital in Paris and will make a report on the influence of the war on the nervous system and mental future of the soldiers, the result of high explosives and other problems of scientific interest to the medical profession.

## WISCONSIN

**New State Officers.**—At the annual meeting of the State Medical Society of Wisconsin, held in Milwaukee, October 5 to 7, under the presidency of Dr. Theodore J. Readelings, Marinette, the following officers were elected: president, Dr. Louis F. Jermain, Milwaukee; vice presidents, Drs. Michael R. Filkinson, Oconomowoc; Mathew S. Hosmer, Ashland, and Robert W. Blumenthal, Milwaukee; secretary, Dr. L. Rock Sleyster, Waupun (reelected); treasurer, Dr. Sidney S. Hall, Ripon; delegate to the American Medical Association, Dr. Thomas H. Hay, Stevens Point; alternate, Dr. L. Rock Sleyster, Waupun; delegate to the National Legislative Council, Dr. Gustave Windesheim, Kenosha; delegate to the council on medical education, Dr. Arthur J. Patek, Milwaukee.

## CANADA

**Personal.**—Lieut.-Col. Henry R. Casgrain, Windsor, Ont., in command of one of the stationary hospitals in Egypt or the Dardanelles, is seriously ill at Alexandria.——Dr. Henry J. Stephens, London, Ont., has been appointed medical officer of the Seventieth Overseas Battalion.——Drs. Jim B. Jupp and Samuel M. McLay, Woodstock, Ont., have joined the Royal Army Medical Corps.——Surg.-Gen. George A. S. Ryerson was the guest of honor at the first regular monthly dinner of The Aesculapian Club, Toronto, the evening of October 14. Dr. Ryerson was the founder of the society. He gave a very interesting address on his recent trip to northern France, recounting many striking incidents.——The American consul in Toronto, Dr. Julius D. Dreber, was recently banqueted by members of the American colony in that city at the American Club.

**Ontario Medical Inquiry Under Way.**—The preliminary hearing of the government commission relative to medical education and practice in Ontario was held in Toronto, October 16, but after a half hour's session adjourned until Thursday, Friday and Saturday, October 21, 22 and 23. The chiropractors will be heard at the Thursday session. There were about 200 medical men at the session. The Academy of Medicine, Toronto, was represented by the president, Dr. William H. B. Aikins, and treasurer, Dr. William A. Young. The academy will act with the Ontario Medical Council whose solicitor is Mr. H. S. Osler, K. C. The Ontario Medical Association is represented by Dr. Richard A. Reeve. The University of Toronto was represented by President Falconer and Mr. J. B. Clark, K. C. It is understood that the university will take the stand that all shall take a prescribed course of four years and practice whatsoever method of therapeutics they may choose.

**Hospital News.**—Official word has been received by Dean Charles K. Clarke of the medical faculty of the University of Toronto that No. 4 Base Hospital, under command of Lieut.-Col. James A. Roberts, has departed for the Mediterranean. The hospital was organized by the University of Toronto in March and April last, and left for England early in May. Since that time it has been doing work in England. It is composed of forty-four medical men, many prominent in practice in Toronto, and seventy-three nurses. Miss Beatrice Bartlett, an Anglican Sister of the Church of England, lectured recently in Montreal on the need of help for the hospitals in France. She has organized several hospitals for the French government. She spoke of thousands of men blinded by gas fumes, thousands made insane. She has made fifty-two trips across the English Channel since the beginning of the war. At one time she saw 10,000 wounded around one base hospital and 40,000 refugees. She took a munition worker on one occasion to France to show him the war conditions, and had showed him tables whereon 9,000 amputations had been performed. His report to 140,000 of his mates had made them all workers for the cause.——McGill's Tent Town Hospital at the front is said to be a model hospital. It is under command of Lieut.-Col. Herbert S. Birkett, Montreal.

## GENERAL

**Ohio Valley Meeting.**—The annual meeting of the Ohio Valley Medical Association will be held in Evansville, November 3 and 4.

**Tuberculosis Examination.**—An announcement has been made by the National Association for the Study and Prevention of Tuberculosis, that a national medical examination day is to be made a part of the plans for Tuberculosis Week, December 6 to 12. December 8 is set for medical examination day and this is the first step toward the securing of an annual physical examination for every one in the United States. Children's Health Crusade Day is planned for December 10.

**Health Education.**—The United States Public Health Service, believing that "education is the road to sanitary progress," has establish a loan library with stereopticon slides which it sends out on request of sanitarians, educators, and others interested in the promulgation of the doctrines of hygiene and public sanitation. There are special sets of slides on diseases of children, hookworm, leprosy, malaria, milk production, mouth hygiene, pellagra, bubonic plague, rural schools, smallpox, tropical diseases, tuberculosis and typhoid fever.

**Prevention of Infant Mortality.**—The sixth annual meeting of the American Association for the Study and Prevention of Infant Mortality will be held in Philadelphia, November 12 to 15. The subjects to be taken up at the meeting include eugenics, effect of the economic standing of the family on infant mortality; infant welfare nursing in small cities, towns and rural districts; institutional mortality; midwifery conditions and prevention of respiratory diseases. The topic of "Economic Aspects of Infant Welfare" will be discussed at a joint session with the Philadelphia County Medical Society at the Philadelphia College of Physicians. Other sessions will take place at the Bellevue-Stratford.

**Bequests and Donations.**—The following bequests and donations have recently been announced:

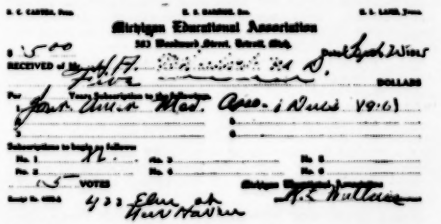
St. Joseph's Hospital, Alton, Ill., $3,000, as the result of a bazaar recently held.

Michael Reese Hospital, Chicago, $25,000; Chicago-Winfield Tuberculosis Sanatorium, Winfield, Ill., $5,000, by the will of Edwin G. Foreman.

Methodist Hospital, Philadelphia, a contingent bequest of $3,600 or more, dependent on the death of direct beneficiaries by a codicil to the will of Charles Fox.

St. Vincent's Charity Hospital, Cleveland, $25,000, for the equipment of the operating department of a new wing to the hospital, by the will of Dr. Dudley Peter Allen, Cleveland.

**Subscription Swindlers Still at Work.**—Every few months we are compelled to warn our readers against fraudulent canvassers and collectors. Seven weeks ago we referred specifically to a scheme operated under the title of the "Cornell Educational Association." In this an individual presents himself as a contestant for a prize in the form of a scholarship awarded by Cornell Educational Association to the one sending the most business in a certain length of time. The scheme is a successful one because it appeals to the sympathies of the good nature of the average man—to the one who wants to help the student get an education.




Hence it is worked under different names. One to which we have already called attention is the National Educational Association; the latest is the Michigan Educational Association. In spite of our repeated warnings, evidence is received every day or two that some of our readers are being caught. To distinctly emphasize this warning, we are reproducing in a reduced form a blank that caught some of our readers within the last two or three weeks. The same names appear as officers on the various blanks—the name of the alleged institution and the canvasser changes.

## FOREIGN

**Control of Vaccination at Vienna.**—The Vienna authorities are utilizing the opportunity afforded by distribution of the bread and flour tickets to householders to gather data in regard to vaccination. Question blanks regarding vaccination are given out with the tickets and they are required to be filled in for each inmate of the building.

**Nipiology—the Science of Infant Welfare.**—Prof. E. Cacace of the University of Naples has coined this term, "nipiology," to express that branch of pediatrics dealing

with young infants. The term is from the Greek "nepios," and he has organized a Nipiologic Society in connection with the Instituto Nipioigienico, of which he is director. The scope of the institute and society is the study of early infancy from the biologic, psychologic and clinical standpoints, and for records and welfare work of all kinds for infants, and for training mothers and prospective mothers. The society in question accepts lay members on payment of small annual dues, and both local and national women's organizations are taking an active interest in the work of the new Societa di nipiologia.

**Scarcity of Physicians in Galicia.**—The Austrian department of the interior has ordered all physicians who have occupied official positions in Galicia to return to their posts at once, regardless of what they may be doing at the time. If serving in hospitals or prisoners' camps they must be relieved of their duties at once and all proceed to Galicia without delay to aid in combating epidemic diseases. All the medical men of Galicia, general practitioners, hospital physicians and surgeons and others who have left Galicia since the war began are urged to return to aid in the pressing work in Galicia unless they are serving now in hospitals or other branches of the sanitary service and the local political authorities certify that their services are indispensable. The word indispensable must be used in its strictest sense. Women physicians are exempted from these orders to return to Galicia. The journey back to Galicia being in the interests of the public safety, the authorities along the way are required to facilitate the journey in every way. Official records are to be kept of the medical men of Galicia and those still missing from their posts may be appealed to through the daily papers. The official decree concludes with provisions to insure registration and a more equable supply of physicians throughout the country, combating the tendency for medical men to gravitate to the cities and leave large areas with inadequate medical attendance. The Runderlass is addressed to all the "district captains" throughout lower Austria; it is published in full in the *Klinisch-therapeutische Wochenschrift* just received.

## PARIS LETTER

PARIS, Sept. 30, 1915.

### The War

#### EARLY DISINFECTION OF WOUNDS OF WAR

At a recent session of the Académie de médecine, Dr. Tuffier, agrégé professor at the Faculté de médecine de Paris and surgeon of the hospitals, read a paper in which he particularly emphasized the importance of complete and early disinfection of wounds of war, since infections constitute for the wounded a considerable aggravation of their condition, producing a mortality which may run from 6.1 per cent., which is that of wounds in general in the first twelve hours, to 32.1 per cent. if the treatment begins after twelve hours. To be efficacious, disinfection should be early. It should therefore be performed by experienced surgeons at the first-aid posts (which, being too much neglected, have need of improvement) and in the ambulances of the first line.

According to Tuffier, there are three zones in the medical organizations: the first where life is saved; the second where limbs are saved, and the third where they are repaired. If the first of these zones operates well, the other two are relieved of much of their burdens. In the first-aid posts, the skin of the wounded patients should be disinfected by tincture of iodin; then visible foreign bodies should be removed from the wound, the flow of blood checked, a compress moistened with Dakin's fluid [see THE JOURNAL, editorial, Sept. 4, 1915, p. 880; Correspondence, Sept. 18, 1915, p. 1048; Queries and Minor Notes, Sept. 25, 1915, p. 1130.—EDS.] placed on the wound, the whole covered with a layer of absorbent cotton held in place by a nonconstricting bandage, and the limb immobilized in a splint. As an antiseptic, Tuffier prefers sodium hypochlorite.

#### NECESSITY OF REPEATED INJECTIONS OF ANTITETANIC SERUM

At a recent session of the Société de médecine de Paris, Dr. Maurice reported five cases of delayed tetanus, one of which was fatal, which occurred in spite of one injection of antitetanic serum, or even two given eight days apart. Maurice emphasizes the necessity of making systematically a second injection of 10 c.c., eight days after the first, and a third eight days after the second, as Dr. Roux has always recommended, if the wound has not yet cicatrized. No report of any case appears to have been published in which three successive injections of serum were given at eight-day intervals. The production of antitetanic serum is at present sufficient to make it possible to apply rigorously this method of repeated injections. The demands for serum for hospital services should therefore receive more liberal response, and it should not be forbidden to give injections to patients who are reported, very often without any indication of the dose employed, as having already received a preventive injection in the first-line treatment.

Dr. Péraire thinks that it is the fear of anaphylaxis which has prevented the employment of repeated injections of antitetanic serum. To avoid such complications, the employment of very small doses should be recommended, for example, 10 c.c. injected repeatedly every two or three days.

#### THE GAIT OF PATIENTS WHO HAVE LOST LIMBS

A patient provided with an artificial leg has a peculiar gait which should be well studied for the sake of remedying as far as possible the defects in such apparatus. Dr. Ducroquet, licencié ès sciences, who read a paper on this subject before the Académie de médecine, thinks that the cinematograph gives the best conditions for such study. He has drawn from such a study technical conclusions of great interest with regard to the rôle played by the length of the stump, the more or less perfect adaptation of the apparatus, etc. He was also enabled thus to compare the two types of artificial legs, the French and the American. The American apparatus permits free flexion of the knee. The gait with such an apparatus is better but more fatiguing; it should be used on comparatively level ground, and it requires constant attention. This apparatus should be reserved for city dwellers. In cases of amputation of the lower leg, whether the apparatus be French or American, the gait, though different in the two cases, is often so perfect that the amputation is not suspected. The patient furnished with French apparatus utilizes the movements of articulation of the foot; furnished with American apparatus, he utilizes only a portion of these movements, and bears his weight chiefly on the fore part of the foot.

#### COMPULSORY REVACCINATION

A law has just been promulgated which in case of war, public calamity, epidemic or threatened epidemic makes vaccination or revaccination against smallpox compulsory for all persons, no matter what their age, who cannot prove a successful vaccination within less than five years.

#### ANOTHER EXCHANGE OF SERIOUSLY WOUNDED FRENCH AND GERMAN PRISONERS

I mentioned in a previous letter (THE JOURNAL, Aug. 7, 1915, p. 545) the first exchange of seriously wounded French and German prisoners of war. Another exchange of the same kind is at present in process. Two convoys of seriously wounded prisoners, returning from Germany by way of Switzerland, have already been received at Lyons.

#### CIDER FOR THE ARMIES

The senatorial army commission has recently adopted the conclusions of an interesting report by M. André Lebert on the utilization of cider by the armies in the field. According to the statistics of the agricultural department, forty-seven out of the eighty-six departments produce cider. Cider, like wine, may be called a national drink, and it will be favorably received by our armies, no matter from what part of the country they come. Moreover, cider supplies enough energy so that it may without danger replace the wine ration. Half a liter (about a pint) of wine furnishes 300 calories (this is the soldier's ration, which has been reduced for some time); a liter (about a quart) of pure cider will furnish the same number of calories. In order to supply the same amount of energy in the liquid nourishment given to our soldiers, a ration of double volume must be supplied. It should be added that the harvest of cider fruit has been exceptional in 1915, and that from 32,000,000 to 35,000,000 hectoliters of cider will be manufactured in France, while the average production of the last ten years is only 18,000,000. On the other hand, our vineyards have this year yielded a very scanty harvest. One consideration which guided the senatorial commission is the fact that a hectoliter (about 26 gallons) of cider costs from 10 to 12 francs (from about $2 to $2.40); a hectoliter of wine at present costs 40 francs (about $8), and the price will probably rise.

#### TRAINING OF DOGS FOR THE MEDICAL SERVICE

The Société nationale du chien sanitaire has just made some interesting experiments on the immense grounds of the

chateau of Maisons-Laffitte in the outskirts of Paris. Ten dogs, held in leash by their trainers, were loosed in turn to seek for soldiers, hidden in the shrubbery, representing wounded patients. Thanks to their marvelously developed sense of smell, very skilfully trained, the animals discovered the soldiers without difficulty, then returned to seek their masters in order to lead them to the place where the wounded had fallen.

One of the founders and first trainers of the society, M. Leroy, read an interesting report on the present employment of dogs in the armies. It was in 1895 that Captain Tolat first undertook to train dogs. In 1908, M. Lepel-Cointet founded the society, which in August, 1914, at the declaration of war, had as yet only 140 dogs. The members of the society made a great effort, and today more than 700 dogs are at the front. About 100 are being trained in the kennels, previous to being sent to the front.

#### THE HOSPITAL OF FRENCH CITIES AT MILAN

At the congress held at Cernobbio by the France-Italie and Italia-Francia committees, the French committee took measures to hasten the installation of the hospital of the French cities offered to the Italian Red Cross, section of Milan, with the proceeds of the subscription of the French municipalities. As I mentioned about two weeks ago, the municipal council of Paris recently voted 20,000 francs (about $4,000) for the ourpose; many other cities have made similar subscriptions. The hospital will be established in the buildings of the Ricordi workshops, an immense establishment which will permit a model organization. The formal opening of the hospital will be held during November.

#### MENTION OF A CIVILIAN PHYSICIAN FOR GALLANT CONDUCT

Dr. Sarrazin, mayor of la Couture, department of Pas-de-Calais, has been mentioned for gallant conduct, "never having ceased, under continual bombardment, to traverse the country in order to visit the sick; during the German occupation, the firmness and dignity of his attitude contributed to safeguard the interest of the commune, giving to his fellow citizens a fine example of civic coolness and courage."

### Death of Prof. Marcel Oui

Dr. Marcel Oui, professor of the obstetrical clinic at the Faculté de médecine de Lille, has just died in his forty-eighth year at Bordeaux, where he was fulfilling his military duties as head of the first surgical sector of the eighteenth region. He had been a corresponding member of the Académie de médecine since 1910.

## LONDON LETTER

London, Oct. 1, 1915.

### The War

#### THE SUPPLY OF ARMY SURGEONS

The problem of supplying the new armies with a sufficient number of surgeons still remains a difficulty, although every means is being taken both by the profession and by the military authorities to deal with it. The country is divided into districts in each of which has been constituted a war emergency committee. From the central committee the local organizations are informed of the numbers which each district is estimated to produce, and the answer to this intimation is given by the physicians in the district concerned. Local meetings of the profession have been called, and some of these have been addressed by representatives of the War Office or by prominent members of the profession. Thus all the physicians of the country are impressed by the urgency of the emergency. So far the results are encouraging, but whether they are sufficient remains to be seen. The depletion of hospital staffs for military purposes is causing serious trouble and anxiety, which is well illustrated by the statement of a deputation from Manchester to the executive subcommittee of the war emergency committee. The committee recently issued a circular urging physicians of military age to place their services at the disposal of the War Office. It was pointed out by the chairman of the board of management of the Manchester Royal Infirmary (one of the greatest of the provincial hospitals of England) that in normal times they had 530 beds, 240 had now been added for military purposes, a central branch contained 60 more, and 135 extra beds had also been provided at the relief hospital, making a total of nearly 1,000 beds, over 300 of which were at the disposal of the army. The range of the work is indicated by the following figures: In 1914, 28,000 outpatients and 13,000 inpatients were treated. In a normal year over 20,000 cases of accident come to this hospital and about 7,000 operations are performed. The work is carried on by an honorary staff of 33 and a resident staff of 23 at the infirmary, 2 at the relief hospital. Of the honorary staff, 27 are engaged in the central branch, and 2 at the relief hospital. Of the honorary staff, 27 are engaged in military work, some being wholly absent on such duty, while others doing part work are able to give only partial attention to hospital patients. The resident staff is now reduced to 8 at the infirmary and 1 at each of the auxiliary branches. The work is being done by senior students, but the number of these is limited. The work of the hospital in these circumstances is largely supervised by the resident medical officer, the resident surgical officer, and the accident house surgeon, to whom also much of the clinical education of the students falls. These posts are held by highly tried and competent men; their tenure is often three years, and the occupants are next in succession to vacancies on the permanent honorary staff. If the circular of the war emergency committee deprived the Manchester Royal Infirmary of their services at this juncture the difficulties of carrying on the work would be insuperable. The deputation asked that these men might receive an intimation that their services in their present positions are so valuable that they would not be called on; at any rate that they should receive a notice of one or two months so that the hospital could make some arrangement. The committee replied to the deputation by saying that the difficulty with regard to residents would have to be met in some places by the honorary staff becoming resident, in some by the employment of outside physicians as half timers, and in some by the principle of employing in succession recently qualified physicians who had already taken commissions in the army, though this could obtain only at hospitals to which a teaching school was attached.

#### WOMEN PHYSICIANS AND THE WAR

The shortage of physicians has given a great impetus to the employment of women physicians, who are now sought for posts which were not previously open to them. At the beginning of the war they organized and ran entirely Red Cross hospitals in Belgium, France and Serbia. One of their units on the way to Serbia was stopped at Malta to attend to the British wounded. When one of their earliest hospitals under the French Red Cross, stationed first in Paris and later at Wimereux, was no longer needed it was taken over by our own War Office and is now doing excellent work. But it is in civil life that the greatest demand for women physicians has arisen—to take the place of men in all sorts of capacities, public and private. The medical journals are full of advertisements offering posts to women, who before the war were practically never mentioned, and though not formally were tacitly excluded from the posts advertised. Now the position has become so acute that a large hospital sent an application to the secretary of the Women's Medical School, "Send us *any* women at *any* salary." However, it must be borne in mind that the large proportion of the posts now offered are for newly qualified and junior physicians. Practically none are offered to older and more experienced women. Many of the women at home on furlough from India and other parts are filling the posts of men who have undertaken military service. Even women who have never practiced before, or who have retired, are giving their services. An impetus has been given to the enlargement of the largest medical school for women in the country, the London School of Medicine for Women, to train more students, and a fund of $150,000 is being raised for the purpose of enlarging the school.

#### MAIMED SAILORS AND SOLDIERS

One of the ghastly results of the war, the sailor or soldier who has lost a limb, is everywhere in evidence. Needless to say, everything possible has been done to show the gratitude of the country to these valiant men. A special hospital has been erected at Roehampton where they are provided at the expense of the state with artificial limbs and taught how to use them. Their numbers are so great that 800 are at the present moment awaiting admission, although the hospital has been considerably enlarged. With a view to their future employment and also to provide useful occupation for the men while in hospital, workshops fitted with model motor chassis, electrical appliances, lathes, etc., are being organized with competent instructors. A man who has lost his right hand is taught to write with the left, and classes for other industries will be arranged. An employment bureau working in conjunction with existing societies and employers of labor has also been established, and already a number of men have been placed in good situations.

## BERLIN LETTER

BERLIN, Sept. 21, 1915.

### Death of Professor Ewald

Prof. C. A. Ewald died in Berlin yesterday. Had he lived until October 30, he would have been 70 years of age. Two months ago he developed a fever, which, although of an indefinite nature, later was assumed to be a symptom of leukemia. This diagnosis was not confirmed by a necropsy, and it is probable that another diagnosis might have been made on the basis of the postmortem report, because leukemia occurs but rarely at so advanced an age as 70. Next to Kussmaul and Leube, Ewald was most responsible for the founding of the clinic for stomach diseases. Although an associate of the men mentioned, he always worked independently, contributing many original observations of the diseases of the gastro-intestinal tract. Ewald was born in Berlin, and his medical studies were made here as well as in Heidelberg and in Bonn. His doctorate thesis, published in 1870, was entitled "The Histology of the Salivary Glands," showing that his interest in the gastro-intestinal tract was already developed at the time of his graduation. In 1871 he was appointed an assistant by Frerichs in the first medical clinic. He began to lecture in 1874; in 1882 he was made extraordinary professor, and a few years ago was advanced to a regular professorship. In 1876 he was appointed director of the city gynecologic institute, and in 1886 he was appointed Senator's successor in the direction of the medical division of the Augusta Hospital.

Well worthy of mention is his long term of service as editor of the *Berliner klinische Wochenschrift*, in which position he succeeded Professor Waldenburg in 1881. He was sole editor until 1907, when he associated Professor Posner (son of the founder of the *Wochenschrift*) with himself. Until a few years ago he remained in active service as editor. The most notable of his many contributions to medical literature are his lectures on digestion and his book on diseases of the stomach. Among his other literary efforts are a handbook of therapeutics; the articles on diseases of the thyroid, myxedema and cretinism in Nothnagel's "Special Pathology and Therapeutics," and a book on diseases of the liver. He contributed to many compilations and sets of books. Of these should be mentioned Eulenburg's Real-Encyclopedia. An enormous number of clinical articles were contributed by him to the literature, covering all phases of internal medicine, and all of his illustrations were drawn by himself, both black and colored. His mentality was unclouded until the end. He occupied himself continuously with literary work, and even in his last days attempted to complete his share of the manuscript for a collaborated work.

Ewald's influence on the development of his specialty is well shown in the work done by his pupils. Nearly all the prominent younger men who are devoting their time to the study of the diseases of the gastro-intestinal tract have been pupils of Ewald, especially Boas, Rosenheim, Strauss and L. Kuttner. In spite of his activities in the field of medicine, Ewald found time to devote himself to other things, such as the building and maintenance of hospitals for children on the seacoast. For more than thirty years he was secretary of the society for "Seehospize" (seaside sanatoriums). For twenty-five years he was librarian of the Berlin Medical Society, rendering splendid and worthy service. He felt deeply the action taken by this society not long ago when it failed to reelect him to his position because of a misunderstanding of the attitude taken by him in the matter of the Russian consultations scandal, as I mentioned at the time. He never forgot this action while he lived. Science and literature in general also commanded his lively interest. As a relative of Du Bois-Reymond he soon became a valuable member of the more cultured Berlin society and, together with his popular wife, he succeeded in making his home the gathering place for the devotees of art and science. He also had many international relationships, especially with England. Personally, he was a little hard, and his rather extraordinary lack of feeling for his associates and colleagues often aroused ill feeling against him, and probably had much to do with the action taken by the Berlin Medical Society, mentioned above. His death certainly will leave a great void in the medical circles of Berlin as well as in those of the world in general.

### American Red Cross for Russia

By an agreement between Germany and Austria-Hungary on the one hand, and Russia on the other, brought about through the agency of the American ambassador at Berlin, physicians and nurses of the American Red Cross will be sent to the prison camps and hospitals in Russia and Siberia to render professional service. The members of this group have been in Germany and Austria-Hungary for the past year giving service in Gleiwitz, Kosel, Vienna and Budapest. The physicians and nurses of the American Red Cross in Serbia have offered their services in the work. About twenty-five American physicians and fifty nurses will be engaged in this work, the expenses being paid by Germany and Austria-Hungary. The American Red Cross will contribute the medicines and bandages.

### Injuries in Aviation Accidents

The surgeon of an aviation corps, Dr. Schöppler, has noticed that the injuries sustained by falling from a great height present a typical picture if the motor of the aeroplane does not fall on the aviator's body. As a rule there are found fractures of the base of the skull, tearing of the lung tissues, and typical fractures of the upper and lower extremities, no matter how far the body has fallen. Fracture of the sternal end of the clavicle, of the forearm, of the lower leg above the epiphyseal line, and in the middle of the femur in the upper third, and complete comminution of the tarsus are present in nearly every case. Injuries of the spinal column are seen but rarely, whereas the viscera frequently burst or are torn to pieces; especially is this true of the heart, liver, lungs and the large blood vessels.

### Personal

September 21, Professor Eberth, formerly professor of pathologic anatomy in Halle, celebrated his eightieth birthday. His claim to fame is the discovery of the typhoid bacillus. Since 1911 he has been living in a suburb of Berlin.

## Marriages

HORACE HUTCHINS LE SEUR, M.D., Niagara Falls, N. Y., to Miss Helen Minerva Crossett of Cortland, Ill., at Batavia, N. Y., September 29.

CLARENCE FLACK GRAHAM, M.D., Albany, N. Y., to Miss Mary Jarvis Fish of Brookline, Mass., at Rye Beach, N. H., October 6.

CHARLES PERCY NOBLE, M.D., Boise, Idaho, to Miss Elizabeth M. Scanlan of St. David's, Pa., at Towson, Md., October 7.

HENRY C. WALBECK, JR., M.D., Stroud, Okla., to Miss Amelia Bedwell of Louisville, Ky., in Sapulpa, Okla., recently.

EUGENE BASCOM WRIGHT, M.D., Richmond, W. Va., to Miss Elsie E. Daub of Baltimore, in Philadelphia, September 11.

CLARA AMELIA HALE, M.D., to George Groot Gregory, both of Syracuse, N. Y., at Fayetteville, N. Y., September 15.

HARRY EDWIN KLEINSCHMIDT, M.D., St. Louis, to Miss Anna Josephine McNabney of Sparta, Ill., October 7.

EDWARD JOSEPH O'BRIEN, JR., M.D., Brighton, Boston, to Miss Isabel Roche of Medford, Mass., September 29.

ALEXANDER HAMILTON RICE, M.D., Boston, to Mrs. Eleanor Elkins Widener of Philadelphia, in Boston, October 6.

THOMAS N. FLEMING, M.D., Cold Spring, Minn., to Miss Rose Bingenheim of Creighton, Neb., September 17.

MATTHEW LINCOLN TURNER, M.D. Griswold, Iowa, to Miss Loretta E. Brown of Des Moines, Iowa, October 2.

MARTIN HEYDEMANN, M.D., Boston, to Miss Lillian Adelaide Pelonsky of Roxbury, Boston, October 6.

EDWARD LINGAN BOWLUS, M.D., Middletown, Md., to Miss Georgia Martin Potter, in Baltimore, October 6.

WILLIS GUY MUDD, M.D., to Miss Ruth Faustina Acorn, both of Denver, in San Francisco, August 4.

JAMES BRAY BRADLEY, M.D., Eaton Rapids, Mich., to Miss Pearl Parsall of Howell, Mich., October 12.

JAMES P. H. RUDDY, M.D., Scranton, Pa., to Miss Mary Kilpatrick of Carbondale, Pa., October 12.

VIRGIL E. ROBBINS, M.D., to Miss Ruby Lee Thomas, both of Quitman, Texas, in Dallas, June 20.

HUGH M. MULLIKEN, M.D., Terre Haute, Ind., to Miss Laura Fisher of Philadelphia, recently.

VERNON C. DAVID, M.D., Chicago, to Miss Marguerite Record of Minneapolis, October 16.

## Deaths

**Alice Bellvadore Sams-Turner, M.D.** College of Physicians and Surgeons, Keokuk, Iowa, 1884; aged 56; an honorary member of the Jasper County (Iowa) Medical Society and of the State Society of Iowa Medical Women; health officer of Colfax, Iowa, during 1886 and 1887; one of the founders, a trustee and for twelve years president of the Colfax Free Public Library; died at her home in that city, July 10, from carcinoma of the breast.

**William Merrill McCoy, M.D.** College of Physicians and Surgeons, Chicago, 1901; aged 39; a Fellow of the American Medical Association and a well-known surgeon of north central Washington; formerly of Clinton, Iowa, but for the last ten years a practitioner of Wenatchee, Wash.; died in the Deaconess Hospital in that city, October 1, from intestinal obstruction following an operation for appendicitis, eleven days before.

**Robert Benjamin Barron, M.D.** Bellevue Hospital Medical School, 1883; aged 55; a member of the Medical Association of Georgia; formerly chairman of the Board of Health of Macon; and a member of the board of medical directors of and visiting physician to the Macon Hospital; for twenty years a resident of Macon; died at his home in Gray, Jones County, Ga., October 2, from heart disease.

**James Water McLean, M.D.** Rush Medical College, 1869; aged 72; a Fellow of the American Medical Association and Chicago, Milwaukee and St. Paul Railway Surgeons' Association; local surgeon of that road at Fayette, Iowa; died at his home in that city, October 4, from bronchopneumonia.

**Walker W. McConnell, M.D.** Western Reserve University, Cleveland, 1888; Jefferson Medical College, Philadelphia, 1898; a member of the Medical Society of the State of Pennsylvania; director of the First National Bank of Harrisville; died at his home in that city, July 2, from nephritis.

**Stephen Garland Sharp, Jr., M.D.** Medical College of Ohio, Cincinnati, 1905; aged 32; surgeon for the Braden Copper Company and in charge of the company's hospital at Rancagua, Chile, South America; died in Valparaiso, Chile, about September 28, from spinal meningitis.

**Cameron Chamberlin, M.D.** Medical College of Indiana, Indianapolis, 1902; aged 36; a Fellow of the American Medical Association; a well-known practitioner of Indianapolis; died in the Presbyterian Hospital, Chicago, October 4, from spinal meningitis.

**James C. Word, M.D.** Jefferson Medical College, 1860; aged 81; surgeon in the Confederate service throughout the Civil War and since that time a practitioner of Monroe County, Miss.; died at the home of his daughter in Aberdeen, Miss., October 3.

**Theodore St. John, M.D.** New York Homeopathic Medical College, New York City, 1881; aged 83; a pioneer of Nevada, but since 1878 a resident of Connecticut; died at his home in Thomaston, Conn., September 11, from cerebral hemorrhage.

**Charles Hamilton Browning, M.D.** Western Reserve University, Cleveland, 1897; aged 44; a Fellow of the American Medical Association, and a prominent practitioner of Oberlin, Ohio; died at his home, September 28, from cerebral hemorrhage.

**Edward Osband Sutton, M.D.** University of Michigan, Ann Arbor, 1903; aged 40; of Tacoma, Wash.; a Fellow of the American Medical Association; died in the Seattle General Hospital, October 1, a week after a surgical operation.

**John Prentiss Walker, M.D.** Washington University, St. Louis, 1875; aged 68; of Lamonte, Mo.; a Confederate veteran; died in the University Hospital, Kansas City, October 5, a week after a surgical operation for carcinoma.

**Leonidas Mason, M.D.** Medical College of Ohio, Cincinnati, 1872; aged 78; a veteran of the Civil War; formerly a member of the Indiana State Medical Association; died at his home in Bluffton, Ind., October 5, from pneumonia.

**Frank Lewis Peiro, M.D.** University of Vermont, Burlington, 1866; aged 76; for more than forty years a practitioner of Chicago; a veteran of the Civil War; died at the home of his daughter in Evanston, Ill., October 12.

**Jacob A. Grove, M.D.** Eclectic Medical Institute, Cincinnati, 1869; aged 82; a veteran of the Civil War; died at his home in Kenton, Ohio, October 4.

**Samuel Stein, M.D.** University of the South, Sewanee, Tenn., 1908; aged 32; a member of the Mississippi State Medical Association; of Greenville, Miss.; died in the King's Daughters' Hospital in that place, October 3.

**Date Kimball Thyng, M.D.** University of Minnesota, Minneapolis, 1896; aged 41; of Tacoma, Wash.; a member of the Washington State Medical Association; died in Rochester, Minn., October 2, from leukemia.

**Edmund R. Bolding, M.D.** College of Physicians and Surgeons, Kansas City, Kan., 1898; aged 44; of Eldurg, Kan.; was found dead in his room in the Savoy Hotel, Kansas City, Mo., October 9, from disease of the kidney.

**Hiram Garrett Miller, M.D.** Eclectic Medical Institute, Cincinnati, 1869; aged 90; for many years a practitioner of La Crosse, Wis., and a Forty-Niner; died at his home in Charlottesville, W. Va., October 6.

**Robert J. Roach** (license, Wisconsin, 1899), a practitioner for twenty-two years; died at his home in Cobb, Wis., September 28, from the effects of carbolic acid, self-administered, it is believed, with suicidal intent.

**James D. Brooks, M.D.** Jenner Medical College, Chicago, 1899; aged 43; a member of the State Medical Association of Texas; died at his home in San Angelo, Texas, July 2, from gangrene of the lungs.

**Stephen Marcus Cook, M.D.** College of Physicians and Surgeons, Keokuk, Ia., 1878; aged 82; for nearly fifty years a practitioner of Belle Plaine, Iowa; died at his home in that city, September 30.

**George W. Combs, M.D.** Cincinnati College of Medicine and Surgery, 1879; aged 77; a member of the Illinois State Medical Society; died at his home in Ridgway, Ill., July 2, from endocarditis.

**Absalom S. Walsh, M.D.** Missouri Medical College, St. Louis, 1876; formerly of St. Louis; for many years a surgical instrument dealer of London, England; died recently in that city.

**Henry W. Rihl, M.D.** Jefferson Medical College, 1849; aged 92; for nearly sixty years a practitioner of Germantown, Philadelphia; died at his home in that place, October 11.

**Harry Oliver Lightner, M.D.** Baltimore Medical College, 1896; aged 43; also a druggist; died at his home in Marysville, Pa., October 5, as the result of a nervous breakdown.

**Edwin S. Kellogg, M.D.** Hahnemann Medical College, Philadelphia, 1878; aged 64; died at his sanatorium in Helena, Mont., October 9, from valvular heart disease.

**Floyd M. Young, M.D.** Georgia College of Eclectic Medicine and Surgery, Atlanta, 1887; aged 50; died suddenly in his office in Atlanta, October 6, from acute gastritis.

**Abraham H. Parker, M.D.** Pulte Medical College, Cincinnati, 1889; aged 75; of Macon, Ga.; died in the Macon City Hospital, September 22, from chronic nephritis.

**Charles Wallace Stiles, M.D.** Boston University School of Medicine, 1878; aged 65; died at his home in Somerville, Mass., September 9, from nervous breakdown.

**Thomas M. Bulick, M.D.** Hahnemann Medical College, Philadelphia, 1882; aged 75; died at his home in Harrisburg, Pa., August 9, from acute nephritis.

**John H. Cameron, M.D.** Medical College of Virginia, Richmond, 1860; aged 79; died at his home in Goshen, Va., July 16, from heart disease.

**James D. Bragg, M.D.** Albany (N. Y.) Medical College, 1867; aged 69; died at his home in Bridgeport, Conn., July 23, from acute gastritis.

**George W. Prugh, M.D.** Medical College of Ohio, Cincinnati, 1875; aged 65; died at his home in Cincinnati, October 12.

**E. B. Willan, M.D.** Medical College of Indiana, Indianapolis, 1881; aged 82; died at his home in Trafalgar, Ind., October 5.

**James W. Mitchell, M.D.** Southern Medical College, Atlanta, Ga., 1880; aged 54; died at his home in Atlanta, October 1.

**Madison Bayard Morris, M.D.** Hahnemann Medical College, Philadelphia, 1871; aged 88; died in Edina, Mo., October 2.

**Edward P. Harrison** (license, Indiana, 1897), aged 70; died at his home in Rockport, Ind., July 31, from enterocolitis.

# The Propaganda for Reform

IN THIS DEPARTMENT APPEAR REPORTS OF THE COUNCIL ON PHARMACY AND CHEMISTRY AND OF THE ASSOCIATION LABORATORY, TOGETHER WITH OTHER MATTER TENDING TO AID INTELLIGENT PRESCRIBING AND TO OPPOSE MEDICAL FRAUD ON THE PUBLIC AND ON THE PROFESSION

## LACTOPEPTINE AND ELIXIR LACTOPEPTINE

### Report of the Council on Pharmacy and Chemistry

Mixtures of pepsin and pancreatin are therapeutically irrational; the two substances are not indicated in the same conditions, nor can they act together. Under physiologic conditions, such mixtures are chemically impossible: in a liquid medium the ingredients destroy each other.

Lactopeptine is manufactured by the New York Pharmacal Association, Yonkers, N. Y. It is sold under the claim that it contains pepsin, diastase, pancreatin, lactic acid and hydrochloric acid. This product was among the first proprietary preparations examined by the Council on Pharmacy and Chemistry. The report of the investigation was published in THE JOURNAL, March 16, 1907, p. 959. The preparation was found to be practically inert—"essentially a weak saccharated pepsin," devoid of tryptic activity.

Six years later it was still widely advertised with the same irrational claims. A referee (A) therefore examined Lactopeptine (powdered) for the Council in 1913, and confirmed the previous findings. The referee's report was published in THE JOURNAL, Aug. 2, 1913, p. 358.

Nearly four months after this publication, the manufacturers protested against the report, maintaining, contrary to the findings of the Council, that Lactopeptine possesses pancreatic activity and contains "loosely combined" hydrochloric acid. Referee A therefore repeated his examination, and a second referee (B), independently, examined specimens of Lactopeptine (powder) purchased on the open market for the purpose shortly before.

A few specimens examined by these two referees showed a slight tryptic activity; most of them showed none. The amount of hydrochloric acid present was insignificant.

The reports of the two referees were referred to the manufacturers, who again protested vehemently against these findings, this time on the ground that the specimens were old. The manufacturers also cited the work of three chemists to disprove the findings of the referees, and demanded that the Council reexamine Lactopeptine, making use of fresh specimens. The Council refused for the following reasons:

1. So long as the packages of Lactopeptine are not dated, the activity of specimens known to be fresh is of no practical importance. The activity of the actual market supply is the only question of interest to the profession. The only fair test is that made on specimens representative of the product sold to the ultimate consumer.

2. The evidence presented by the manufacturers did not warrant a reexamination, since the work of two of the chemists cited substantially corroborates the results obtained by the Council's referees from the fresher specimens. The figures for tryptic activity obtained by the third chemist cited by the manufacturers could not be accepted by the Council, since it was at variance with all other known results of investigations of Lactopeptine.

3. As stated at the outset, whatever the tryptic activity of the mixture, it is therapeutically useless. A demonstration of tryptic activity in a mixture containing both pepsin and pancreatin is of merely theoretical interest.

Such activity, of course, cannot be expected, even on theoretical grounds, in liquid mixtures like Elixir Lactopeptine.

The Council therefore again declared Lactopeptine (powder and tablets) and Elixir Lactopeptine ineligible for New and Nonofficial Remedies and authorized publication of the following statement.

W. A. PUCKNER, Secretary.

### THE COUNCIL'S REPORT*

Lactopeptine powder (New York Pharmacal Association, Yonkers, N. Y.) was examined by the Council in 1907. At that time it was claimed to contain

> ". . . the five active agents of digestion—pepsin, diastase (veg. ptyalin), pancreatin, lactic acid and hydrochloric acid—combined in the proper proportion to insure the best results."

The examination showed that the preparation was essentially "a weak saccharated pepsin," containing but small amounts of pepsin, no hydrochloric acid, or mere traces only, and no diastase or pancreatin (THE JOURNAL, March 16, 1907).

In 1913, the product was reexamined, because the claims, as to both composition and therapeutic value, were still being made. Samples were tested both of the American product, and of a British product from John Morgan Richards and Sons, London. The original findings were confirmed and the results were published in THE JOURNAL, Aug. 2, 1913, p. 358. Nearly four months later (November 24) the New York Pharmacal Association wrote to the Council, objecting to the findings and maintaining that Lactopeptine possesses pancreatic activity and contains ("in loose chemical combination") hydrochloric acid. In accordance with the custom of the Council, the work was sent back for review to the referee (A), whose conclusions were then tested by a second referee (B), a physiologic chemist, not a member of the Council, selected because of his special knowledge of the subject.

In December, 1913, Referee A made a large number of new tests to determine proteolytic and amylolytic power. His results show that the ferment activity of the preparation is so low as to merit no recognition in practical use. The tests also show that the amount of lactic acid or "loosely combined HCl" (or both) present is too small to have any appreciable physiologic activity and therefore to be of any therapeutic value.

Nine samples of Lactopeptine purchased in the open market in December, 1913, and January, 1914, were examined be Referee B early in 1914. His studies show absence of amylase in all samples; presence of pepsin, giving weak reactions even when compared with those of old pepsin preparations; complete absence of trypsin in seven out of nine samples, tryptic reaction being obtained in two samples, in one of which the reaction, "slight at best and of no practical import," was obtained only after treatment for twelve hours or more.

The presence of tryptic activity in two out of the nine samples may be due to the fresher condition of these specimens, as indicated by the serial numbers. The evidence shows that it is a commercial impossibility to market mixtures of pepsin, pancreatin and lactic acid so that they can display any material tryptic activity.

It should be reaffirmed that mixtures combining peptic and pancreatic activities are not feasible, because pepsin cannot act except in the presence of acid, and pancreatin is destroyed by acid and by peptic activity. Furthermore, in conditions in which pancreatin is called for, pepsin is not, and vice versa; therefore the administration of mixtures of pepsin and pancreatin would be unjustified, even if both constituents could be expected to exert activity.

The foregoing observations apply to Lactopeptine in powder and tablet form.

While mixtures of pepsin and pancreatin are unscientific and unjustified, theoretically the two substances may coexist

* Owing to lack of space, the referee's reports are here omitted. They will be given in full in the Annual Reports of the Council.

in a solid preparation, and the activity of such a preparation is consequently a proper subject of investigation. Theoretically as well as practically, however, pepsin and pancreatin cannot exist together in solution. The claims made for Elixir Lactopeptine and all other liquid preparations sold as mixtures of pepsin and pancreatin are therefore impossible. The Council has previously taken action (THE JOURNAL, Feb. 2, 1907, p. 434) refusing to approve for inclusion with New and Nonofficial Remedies such preparations, calling the attention of the medical profession and of manufacturers to their worthlessness, and requesting the American Pharmaceutical Association to instruct its committee on the National Formulary to omit from the next edition of that work a liquid preparation of pepsin and pancreatin recognized under the title of "elixir digestivum compositum."

It is recommended that the Council reaffirm this previous action, and that Lactopeptine and Elixir Lactopeptine be declared ineligible for New and Nonofficial Remedies because of conflict with Rule 10 ("No article will be admitted which, because of its unscientific composition, is useless or inimical to the best interests of the public or of the medical profession").

### Manufacturers' Protest and Council's Answer

The foregoing was submitted, together with the findings of the two referees, to the manufacturers. They protested again, alleging that:

#### AGE OF SPECIMENS

*First.*—The specimens of Lactopeptine examined by the second referee were old. The dates of manufacture corresponding to the several batch numbers are supplied by the manufacturers as follows:

| | |
|---|---|
| 2275 (Powder) | September, 1908 |
| 2301 (Powder) | June, 1909 |
| 2312 (Powder) | December, 1909 |
| 2348 (Powder) | October, 1911 |
| 2352 (Powder) | December, 1911 |
| 2364 (Powder) | July, 1912 |
| 2374 (Powder) | March, 1913 |
| 2383 (Powder) | October, 1913 |
| 1638 (Tablets) | October, 1911 |

The manufacturers assert that they do not understand how specimens of these ages could have been purchased on the open market in 1913 and 1914, inasmuch as their agents are and long have been instructed to take up from the druggist all lots of Lactopeptine which, as indicated by the batch numbers, have attained "any appreciable age." The age of the specimens, the manufacturers declare, deprives the table in the second referee's report of "all significance or interest."

As previously stated, however, the specimens of Lactopeptine examined were purchased on the open market in various localities in unbroken packages, in December, 1913, and January, 1914. They thus represent stock used in filling physicians' prescriptions or sold to the public. Neither the referees nor any one connected with the Council had any means of knowing the age of the specimens until the dates of manufacture were furnished by the New York Pharmacal Association. The first tests of the second referee were made in February, 1914, on Specimens 2374 and 2383, which were then, it would appear, about one year old and four months old, respectively. The Council has repeatedly urged that pharmaceutical substances which are subject to deterioration should be dated by the manufacturer, and a similar suggestion has been made by the Bureau of Chemistry of the U. S. Department of Agriculture concerning mixtures containing enzymes. Nothwithstanding the instructions which the New York Pharmacal Association claims to have given its agents, the market supply of Lactopeptine in December, 1913, and January, 1914, was not composed of new stock, and until the manufacturers adopt the practice of dating packages, there can be no assurance that it will be fresh. In this connection it is of interest to note that the Bureau of Chemistry of the U. S. Department of Agriculaure has issued a warning that it will judge such products by the degree of their activity when they reach the consumer, i. e., as they are found on the market.

#### REPORTS OF OTHER CHEMISTS

*Second.*—The New York Pharmacal Association cites the work of several chemists, who have examined Lactopeptine and report the presence of tryptic activity. Dr. S. R. Benedict in December, 1913, reported to the Council "distinct" tryptic activity (digestion in twelve hours by Lactopeptine of 4.2 times its weight of fibrin containing 50 per cent. moisture) in specimens examined by him. These specimens were numbered 2382, and were therefore probably manufactured in October, 1913; compare the dates furnished by the manufacturer for the specimens used by the second referee. No tests against other preparations possessing tryptic activity are reported, and Dr. Benedict expressly disclaims any opinion as to the therapeutic value of the preparation.[1] Dr. P. B. Hawk, whose report was submitted by the manufacturers, found in Lactopeptine by Fermi's method one-fifth the tryptic activity of that of Merck's pancreatin, and by Grützner's method an activity of 18 per cent. of the pancreatin. A test for the production of tryptophan was reported positive. The New York Pharmacal Association also submitted a report from Dr. A. W. Balch, who found pepsin, rennin, trypsin, steapsin, amylopsin and lactic acid present in Lactopeptine; also an amount of combined hydrochloric acid in 1 gm. the equivalent of 1.05 c.c. tenth normal solution or 0.00383 gm. hydrochloric acid. (He reports digestion in twenty-four hours by Lactopeptine of 25 times its own weight of fibrin. "An active extract of pancreas reacted exactly like the Lactopeptine solution.") The serial numbers of the specimens tested by Hawk and Balch are not given, but no doubt they were fresh.

#### CONCLUSIONS

The New York Pharmacal Association demanded that the referee reexamine Lactopeptine, making use of fresh specimens. The Council held that this was unnecessary, for the following reasons:

1. The previous finding of the Council, that specimens of Lactopeptine found on the open market are essentially weak saccharated pepsins, is not to be refuted by examination of fresh specimens. Even if it be assumed that all old specimens of Lactopeptine have been withdrawn from the market since the last purchase of specimens for the use of the Council's referee, there can be no assurance that the stock will be constantly kept fresh. Unless the manufacturers date their product, physicians cannot know that their pre-

1. Dr. Benedict's personal communication to a member of the Council is as follows:

"In the report of the Council upon Lactopeptine which you sent to me, I find the following statement: 'Careful examination failed to show the presence of either diastase or pancreatin.' In this connection I will cite to you the following experiment, carried out by myself: A package containing a 1-ounce bottle of Lactopeptine (powder) with seal unbroken was purchased in the open market and opened in this laboratory. The label bore the special Number 6 2382. Two hundred milligrams of this product was dissolved in 50 c.c. of a 0.25 per cent. solution of sodium carbonate in water. This solution was divided into two portions of 25 c.c. each. One of these portions was boiled at once, and after cooling was added to 1 gm. of moist fibrin contained in a flask. The other portion (unboiled) was also added to 1 gm. of moist fibrin contained in a flask. Both flasks (after addition of 5 c.c. of toluene to each) were stoppered and placed in an incubator at 37 degrees, and left there for twelve hours. Examination of the two flasks at the end of this period showed that the one to which the unboiled solution of Lactopeptine [powder] had been added contained much less solid protein than did the other. Although this fact was obvious to the naked eye, the exact extent of digestion in the two flasks was determined by heating both to boiling, acidifying with acetic acid, diluting to definite volume, filtering and determining the nitrogen in the filtrate by Kjeldahl's method. Subtracting the trace of nitrogen contained in the filtrate of the control flask, the results showed that 42 per cent. of the original fibrin present had been dissolved by the unboiled Lactopeptine solution. This can be ascribed only to tryptic activity under the conditions of this experiment. Furthermore, this is not simply a 'trace' of activity, but is at least sufficiently marked to warrant a statement that this sample showed a distinct tryptic activity. Inasmuch as I have obtained exactly similar results with two other samples of Lactopeptine (powder) (these being the only ones I have examined), I am inclined to question the correctness of the Council's statement regarding the absence of trypsin from this preparation. [As noted above, a fresh preparation was used.—Ed.]

"May I again add that I am making no statement regarding therapeutic value of preparation, and that I have no opinion upon that matter one way or the other. My work was undertaken solely out of interest to see whether trypsin could exist in the powder (which gives a markedly acid solution when dissolved in water). The Elixir Lactopeptine could theoretically show no tryptic activity, nor have I found any trace of such activity in one sample of the Elixir examined.

"In making use of any of the contents of my letters kindly include the statement that my work upon Lactopeptine was done without remuneration of any kind, and was done only for the scientific interest attached to the question."

scriptions are filled with fresh material. Nor is it reasonable to ask that the Council examine the market supply of any given proprietary at a time selected by the manufacturers.

2. Without entering into all questions of detail in the analyses, the Council is willing to accept the reports of Drs. Benedict and Hawk as representative of fresh Lactopeptine powder. It is therefore unnecessary for the Council to make further experiments along this line. The results of these two chemists in no wise contradict the conclusions of the Council's referees, being comparable with those obtained by the referee on the fresher specimens used by them. The experiments of Drs. Hawk and Benedict show a degree of tryptic activity which, though chemically not negligible, is quite without significance practically, even if it could be assumed that the trypsin in the fresh Lactopeptine escaped destruction in the stomach. The figures for tryptic activity given by Dr. Benedict do not differ materially from those of the first referee. Those of Professor Hawk show a tryptic activity of from 18 to 20 per cent. of that of commercial pancreatin—and commercial pancreatins ordinarily are of low tryptic activity, if not inert (see Long and Muhleman: *Arch. Int. Med.*, February, 1914, p. 314.) The reports of these chemists present no reason for changing the conclusion that "it is a commercial impossibility to market mixtures of pepsin, pancreatin and lactic acid so that they can display any material tryptic activity."

The results which Dr. Balch obtained in a test for tryptic activity show a marked discrepancy with those obtained by Drs. Hawk and Benedict, not to mention the Council's referees, and also with the fact that only about 11 per cent. of "pancreatin" is claimed in the published formula of Lactopeptine. The Council is unable to accept Dr. Balch's results for trypsin or rennin as reliable. His other results are without significance and call for no special comment.

3. Even if tryptic activity were conceded to Lactopeptine, the preparation, like all preparations containing pepsin and pancreatin, would still be, as previously stated, therapeutically irrational.

The Council approved the report.

## Correspondence

### The So-Called "New" Anthrax Serum

*To the Editor:*—A recent case of anthrax in man in a New York hospital was given unusual publicity by the daily press. This was primarily due to the great respect which the patient enjoyed in his community, and also to the extraordinary courage he manifested during the course of his horrible affliction.

My stenographer happened to be in New York at the time, and reading of the case, he lost no time in communicating with the attending physicians, calling to their attention an anthrax serum which has been prepared by me and which has been extensively tested, both for its prophylactic and its curative value.

The stenographer had this information from taking dictation from me while I was preparing a paper on the subject for the American Veterinary Medical Association's meeting at Oakland, and also from notes which he transcribed for me in connection with the work during the progress of the experiments.

On telegraphic request the serum was forwarded to New York, and was repeatedly administered to the patient with apparently good results. From the reports of the attending physicians the infection had subsided, but as a result of extreme heart weakness he succumbed quite suddenly, his recovery from anthrax being announced in the bulletins sent out by the physicians.

In the meanwhile the daily press heralded the serum as a wonderful discovery, and made many misstatements as to its preparation, application, origin, etc. It is needless for me to explain the difficulty of having scientific matters correctly quoted in the daily press. It was a useless task to have correct data published as to the serum and its preparation. I was placed as a central light in many newspaper dispatches, which was rather an embarrassing position, realizing the undeserved credit given to me.

I have undertaken the experimental work in immunization against anthrax with a view of establishing a more satisfactory method of immunization than those which are now employed in this country. The simultaneous method—consisting of an injection of a potent anthrax serum and a carefully standardized spore vaccine—proved very promising and to my mind superior to the Pasteur method. The results of these experiments were embodied in my paper read before the American Veterinary Medical Association, in which have also been included the results of field experiments.

During the progress of the work we had occasion to treat a considerable number of affected animals with our serum, and obtained remarkable recoveries in a very high percentage of cases, including some of the most severe types. The stenographer, knowing of these results, praised the curative qualities of the serum somewhat beyond its known value, which naturally was interpreted by the newspapers as something wonderful.

It is needless for me to state that anthrax serum has been prepared in Europe by many institutions, and that this phase of immunization has been practiced for several years. We have, however, succeeded in concentrating the serum by a method of precipitation and are now endeavoring to prepare the specific proteins of the immune serum in a dry form to insure its keeping qualities and to prevent contamination. Furthermore, the vaccine which is being used in connection with the serum is an accurately standardized spore vaccine, by which it is possible to establish accurately the number of spores given to an animal.

Although I am satisfied that members of the medical and veterinary professions are familiar with the work which has been carried on in the immunization against anthrax, nevertheless I deem it advisable to state my position in the case in order that I may not be misjudged as attempting to claim priority for something which should and is known by all professional men to belong to others.

It might be of interest, however, to state that in the course of the experiments it was necessary for us to obtain anthrax serum for comparative tests, and to our surprise we found that it was not obtainable in this country. We therefore imported a quantity of such serum, and to our further surprise the comparative test revealed our serum to be at least twice as potent as the one of foreign make, and this may explain the splendid curative value of our anthrax serum.

A. EICHHORN, Washington, D. C.
Chief, Pathological Division, Bureau of Animal Industry, U. S. Department of Agriculture.

### Statistics Regarding Motor Accidents

*To the Editor:*—Your editorial on the safe and sane Fourth (THE JOURNAL, Aug. 28, 1915, p. 803), is of especial interest to me, for I have followed closely the campaign begun by you in 1903. Your success has suggested that I urge you to begin another campaign which, prosecuted with the same zeal as the other, will result in saving many lives, physical suffering and property each year. I refer to automobile accidents. If you will follow the same plan, you will not be compelled to go far in gathering statistics to get appalling figures—figures that will surely arouse the public press to assist you.

W. S. CLARK, M.D., Los Angeles.

### Rightly Objects to "Guards"

*To the Editor:*—When I saw in a daily paper the statement that the "guards" at the Springfield State Hospital, Sykesville, Md., had asked an opportunity to form an organization for military drill, I was inclined to make another attempt to dissuade newspaper writers from using the phraseology of medieval times in the care of the insane. But the

constant use of the terms "keepers," "guard," "cell," "maniac" and the like, in reference to hospitals for the insane has discouraged me. When, however, a medical journal prints information from Maryland, presumably furnished by a medical man, in which the word "guard" is used, a term alike offensive to patients and friends of patients in hospitals, and to those who have labored for real hospital methods in our institutions for the insane, a feeling of discouragement if not something worse results.

EDWARD N. BRUSH, M.D., Towson, Md.

## Queries and Minor Notes

ANONYMOUS COMMUNICATIONS and queries on postal cards will not be noticed. Every letter must contain the writer's name and address, but these will be omitted, on request.

### S. WEIR MITCHELL — RELATIONS BETWEEN ANESTHETIST AND SURGEON

*To the Editor:*—Please give me: 1. (*a*) The first name of S. Weir Mitchell. (*b*) The year of his birth and death.

2. Has the operator any legal right to dictate to the anesthetist as to what anesthetic shall or shall not be given?

3. Has the anesthetist the legal right to stop the operation at any point if he considers the patient at the time too weak to sustain further manipulation?

A. S. MCCORMICK, M.D., Akron, Ohio.

ANSWER.—1. (*a*) Silas. (*b*) Born Feb. 15, 1829; died Jan. 4, 1914. The death notice of Dr. Mitchell appeared in THE JOURNAL, Jan. 10, 1914.

2. The anesthetist is usually selected by the surgeon. It is customary, as a matter of professional courtesy, for the anesthetist to be governed by the wishes of the surgeon in charge of the case. There is no question of "legal right" involved as there are no laws on this subject. If the anesthetist and the surgeon are unable to agree as to the anesthetic to be used, the anesthetist should withdraw and permit the surgeon to select an anesthetist whose views are in harmony with his own. The responsibility for the result of the operation rests on the surgeon.

3. Here again no "legal right" is involved. It is customary for the anesthetist to call the attention of the surgeon to the patient's condition should dangerous symptoms appear, but it is entirely at the discretion of the surgeon whether or not the operative manipulations should be continued. A few court decisions in malpractice cases touch on the question indirectly, the general principle upheld being that where two or more physicians are jointly in attendance on a patient, each is responsible for the result of his own acts, but not for the results of the acts of the others.

### ANAPHYLAXIS FROM DIPHTHERIA ANTITOXIN IN PERSONS PREVIOUSLY INJECTED

*To the Editor:*—Is it contraindicated to give diphtheria antitoxin to a patient having diphtheria if the patient had diphtheria antitoxin injected either for immunizing or curative purposes at some time previous, say from six months to several years?

In what percentage of cases do we get anaphylactic reactions? Are these very dangerous conditions?

Four days ago I gave a child aged 3 years 5,000 units; one and one half years ago I gave the same child 5,000 units. So far I have had none but gratifying results.

P. N. WENTZ, M.D., York, Pa.

ANSWER.—The possibility of an anaphylactic reaction should not prevent the use of antitoxin in a patient with diphtheria, even though he has previously received antitoxin for immunologic or curative purposes. In such persons it is advised to give a small amount (from 0.1 to 1 c.c.) subcutaneously; if no severe symptoms appear after one or two hours, the full dose may be given.

Several considerations make it difficult to state the probability of appearance of anaphylactic phenomena in any given case. In addition to individual peculiarities which no doubt play a part, the volume of serum injected and the method of preparation of the serum are important factors. Weaver (*Arch. Int. Med.*, June, 1909, p. 485) found that when the volume of serum was small (from 1 to 9 c.c.), serum disease (urticaria, erythema, arthritis, etc.) appeared in 10.9 per cent.; with increasing volumes of serum, the percentage of reactions progressively increased so that in those cases receiving from 80 to 280 c.c., serum disease was noted in 61 per cent. The more recently developed methods of concentrating and refining antitoxin yield serums of high potency, so that the necessary amount of antitoxin units is available in small volume of serum, and the probability of serum disease is accordingly decreased. The removal by the refining process of certain albumin fractions of the serum decreases the incidence of serum disease. The older statistics, therefore, probably show a higher incidence of reactions than are being obtained at present with concentrated serum.

In persons receiving serum for the first time, serum disease appears in the majority of cases from the seventh to the tenth day, but sometimes earlier or much later, and rarely need cause alarm. Of 200,000 persons injected with serum, there was but one death from anaphylactic shock (Kolle).

The reactions which follow reinjections of serum (that is, in persons previously injected) may be immediate, and in any case are likely to occur earlier than those after first injections (accelerated reactions). The immediate reactions usually present, in addition to urticaria and other symptoms of serum disease, are symptoms of respiratory disturbance, cyanosis, rapid pulse, etc., and correspond to the anaphylactic shock seen after reinjection of experimentally sensitized animals. Epinephrin and atropin have been used with benefit. Even these severe reactions are very rarely fatal. About 50 per cent. of fatal instances of anaphylaxis have occurred in asthmatics, and in some of the latter the fatality followed the first injection of serum. When the reinjection is made within six days after the first injection in man there is practically no danger of anaphylaxis; reinjection in from three to eight weeks after the first injection is followed by some degree of anaphylaxis in about 90 per cent. of cases; reinjection after six to nine months is followed by reaction in about 50 per cent. of cases (Seidel: *München. med. Wchnschr.*, 1915, lxii, 1210). With the lapse of years the percentage of reaction on reinjection is further decreased, and usually appears as an accelerated reaction.

The danger of serum reactions even in previously injected persons is so much more remote than the danger from diphtheria that the physician should not hesitate to avail himself of so potent a remedy as antidiphtheric serum.

### ARTICLES ON ARNETH FORMULA

*To the Editor:*—Please furnish me a reference to the original article and subsequent literature on the Arneth formula.

P. L. QUERENS, M.D., New Orleans.

ANSWER.—The following is a list of references on this subject:


Arneth, Die neutrophilen weissen Blutkörperchen bei Infektionskrankheiten, Jena, G. Fischer, 1904; *Folia haemat.*, 1904, i, 492.

Briggs, H.: Clinical Value of Arneth Method of Blood Examination, *California State Jour. Med.*, August, 1912; abstr., THE JOURNAL, Aug. 24, 1912, p. 674.

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### CZAPLEWSKI'S CARBOLFUCHSIN STAIN

*To the Editor:*—1. Please give the formula for Czaplewski's carbolfuchsin stain, and state where it can be obtained.

2. Will Ziehl's carbolfuchsin stain the *Endamœba buccalis* properly?

C. A. SELLERS, M.D., Hartford City, Ind.

ANSWER.—1. Czaplewski's stain is prepared as follows: One gm. of fuchsin in 5 c.c. of phenol are placed in a dish; 50 c.c. of glycerin are added, with constant stirring, and then diluted with 100 c.c. of water. The constituents of the stain can be purchased from any medical supply house. We do not know where the stain may be purchased already mixed.

2. The following directions are given by Bass and Johns for staining *Endamœba buccalis* properly: Spread pus on slide; fix with heat; pour on carbolfuchsin; wash off at once; stain with Loeffler's methylene blue from one-fourth to one-half minute; wash, dry and examine with oil-immersion lens.

# Medical Education and State Boards of Registration

## COMING EXAMINATIONS

ARKANSAS: Regular, Little Rock, November 9-10. Sec., Dr. T. J. Stout, Brinkley. Homeopathic, Little Rock, November 11. Sec., Dr. Scott C. Runnels, 900 Scott St., Little Rock.

CONNECTICUT: Regular, New Haven, November 9-10. Sec., Dr. Charles A. Tuttle, 196 York St., New Haven. Homeopathic, New Haven, November 9. Sec., Dr. Edwin C. M. Hall, 82 Grand Ave., New Haven. Eclectic, November 9. Sec., Dr. T. S. Hodge, 19 Main St., Torrington.

LOUISIANA: New Orleans, December 2-4. Sec., Dr. E. L. Leckert, 716 Macheca Bldg., New Orleans.

MAINE: Portland, November 9-10. Sec., Dr. Frank W. Searle, 776 Congress St., Portland.

MISSISSIPPI: Jackson, October 26-27. Sec., Dr. E. H. Galloway, Jackson.

NEBRASKA: Lincoln, November 10-11. Sec., Dr. H. B. Cummins, Seward.

NEVADA: Carson City, November 1. Sec., Dr. Simeon L. Lee, Carson City.

SOUTH CAROLINA: Columbia, November 9. Sec., Dr. A. Earle Boozer, 1806 Hampton St., Columbia.

TEXAS: Dallas, November 9-11. Sec., Dr. M. P. McElhannon, Belton.

WEST VIRGINIA: Elkins, November 9. Sec., Dr. S. L. Jepson, Charleston.

### Higher Preliminary Standard

An official communication from the secretary of the Virginia State Board of Medical Examiners states that the requirements of preliminary education by that board, according to the provisions of the medical practice act, will be automatically changed as the requirements of the University of Virginia, department of medicine, are increased. The latter has adopted, in addition to a four-year high school education, the requirement of two years of collegiate work, to become effective for all students entering in the session of 1917-1918 and thereafter. The licensing board of Virginia, therefore, will hold a similar standard as the minimum requirement of preliminary education for all graduates of 1921 and thereafter who seek licenses to practice medicine in that state.

### Rules Governing Reciprocity in New Hampshire

All applicants for registration by reciprocity must appear in person before the board at Concord, N. H., and bring with them a certificate as to moral character, also documentary proofs that their preliminary education is up to the standard required by the laws of this state, and that they graduated from a Class A medical school according to the classification of the Council on Medical Education of the American Medical Association. They must also present documentary evidence that they have passed some state board examination. If the applicant's qualifications are satisfactory, on payment of the fee of $20, he will be granted a license to practice medicine in New Hampshire.

All graduates of medicine prior to the year 1907 must bring proofs of their education, both preliminary and professional, and proof that they hold a state license. Each case will be considered on its merits and, if satisfactory to the board, a license will be granted.

No person who has failed to pass the New Hampshire state examination will be considered as a candidate.

### Wyoming March Report

Dr. H. E. McCollum, secretary of the Wyoming State Board of Medical Examiners, reports the written examination held at Laramie, March 10-12, 1915. The total number of subjects examined in was 10; total number of questions asked, 100; percentage required to pass, 75. The total number of candidates examined was 6, of whom 5 passed; 1 osteopath did not complete the examination. The following colleges were represented:

| College | PASSED Year Grad. | Per Cent. |
|---|---|---|
| Georgetown University | (1904) | 83.2 |
| University of Louisville | (1911) | * |
| College of Physicians and Surgeons, Boston | (1912) | 76 |
| College of Physicians and Surgeons, Dallas | (1905) | 80.4† |
| Medical School of Osaka | (1899) | 80.4 |

* No grade given.
† Graduation of this applicant not confirmed by official information.

### Wyoming June Report

Dr. H. E. McCollum, secretary of the Wyoming State Board of Medical Examiners, reports the written examination held at Laramie, June 28-30, 1915. The total number of subjects examined in was 10; total number of questions asked, 100; percentage required to pass, 75. The total number of candidates examined was 3, all of whom passed. The following colleges were represented:

| College | PASSED Year Grad. | Per Cent. |
|---|---|---|
| University of Colorado | (1911) | 79.1 |
| Missouri Medical College | (1899) | 76.4 |
| Syracuse University | (1903) | 84.5 |

# Book Notices

THE AMERICAN ENCYCLOPEDIA AND DICTIONARY OF OPHTHALMOLOGY. Edited by Casey A. Wood, M.D., C.M., D.C.L., Professor of Ophthalmology, College of Medicine, University of Illinois. Volumes IV-VII. Cloth. Price, $6 per volume. Chicago: Cleveland Press, 1915.

Volumes IV, V, VI and VII of this monumental work have come from the press in rapid succession. They uphold the high standard of the early volumes both in manner of treatment of the subjects covered and in material characters. Many of the articles are by the same authors as articles found in the first three volumes. The book has now reached the end of the letter G, and of course has covered many important subjects in ophthalmology. In Volume IV, among the extended and leading articles are those on color blindness, comparative ophthalmology and congenital anomalies of the eye. Volume V contains a complete review of the subject of conservation of vision, an extremely interesting article on Jacques Daviel and the extraction of cataract, and a practical study of the cornea and its diseases. Volume VI includes articles on electricity in ophthalmology, electric magnets, exophthalmic goiter with especial relation to its ocular aspects, and a complete and helpful article on examination of the eye. Volume VII, the last of the series here considered, discusses eye glasses, the eyes of soldiers and sailors, and the use of color signals on railroads, in harbors, at sea, etc. It makes a most interesting and practical discussion of the subject. Glaucoma is given much space in the volume, and the scientific information developed to date concerning it is well and completely set forth. Much biography is scattered throughout the volumes, with portraits, in many instances, of the past masters in ancient and modern ophthalmology. Good illustrations abound throughout.

The reader is continually impressed with the fact that a vast amount of time and energy and an excellent sense of discrimination and selection have accompanied the preparation of this monumental work. It is time and energy well spent, for the value of such a series is not for a day or a year, but for generations to come.

CANCER. Its Study and Prevention. By Howard Canning Taylor, M.D., Gynecologist to the Roosevelt Hospital, New York. Cloth. Price, $2.50 net. Pp. 330. Philadelphia: Lea and Febiger, 1915.

This is a concise yet complete presentation of our knowledge of the various forms of cancer (and sarcoma). The subject is treated from historical and statistical points of view and as to etiology, clinical pathology, diagnosis and treatment. The study and prevention of cancer constitute one of the most important and at present most discussed problems confronting either laity or profession. The value of the book is enhanced by its reiteration of the necessity for early treatment. This can be brought about only through recognition of the earliest symptoms of cancer, and these the author constantly emphasizes throughout.

## Medicolegal

### Risk Assumed by Those Undertaking Work they Know they are Not Physically Fitted for

*(Tennessee Coal, Iron & Railroad Co. vs. Moody (Ala.), 68 So. R. 274)*

The Supreme Court of Alabama reverses a judgment obtained against the complainant by plaintiff Moody, an epileptic, who sued for damages for personal injuries sustained by him by falling into a pit and being burned, while in the company's employ. It appeared that he had been employed by the company at its furnaces for about nineteen years, when he began to have epileptic fits, and was laid off from work for two or three months. He was then employed to break the runway of molten cinders, or "to work the cinder fall," as he stated it. This he was accustomed to do, with or without direct orders, and was doing when he fell into the pit. He had been ordered by the superintendent thirty to forty-five minutes before, but there was no evidence of any indication then that he was going to have a seizure, although it was said that his spells gave visible indications in conduct or appearance from fifteen to forty minutes before an actual seizure. The plaintiff knew and understood his infirmity, but it did not appear that the superintendent had any knowledge of it, unless it was inferable from notoriety about the plant. The court holds that the order in question was not negligent under the circumstances, and that the plaintiff assumed the risk of injury when he undertook to do the work in which he was engaged.

The court says that the reported cases present only a few instances in which a servant has sought to recover from a master for injuries which resulted primarily from the physical unfitness of the servant for the work which he had undertaken to do. In this case it might perhaps be justly affirmed, on the plaintiff's own showing, that, with or without the order complained of, he would equally have undertaken his regular work on this occasion, with the same result, and hence that the order was not the proximate cause of his injury. But conceding that it was, the company could not be held responsible for that result.

So far as their own safety is concerned, persons not under contractual disability should be, and are allowed to determine for themselves, whether their physical infirmities, known to themselves, shall debar them from any particular employment. According to the nature and degree of their infirmities, they must be more or less exposed to dangers, naturally resulting from their attempt to serve, in almost any of the modern industries. It is no doubt a hard choice, but such persons must estimate for themselves the chances of injury, and it would be unjust as well as illogical to visit the consequences of their choice on their employers. It may be a matter of delicacy as well as difficulty for the employer to undertake in each case to determine the nature and extent of the malady or infirmity of one who offers to work, or the likelihood of injury resulting therefrom; and the court thinks the employer may, without liability, legal or moral, accept the judgment of a would-be servant who knows his own condition.

Nor would the imposition of liability on the master in such cases be either politic or humane, even from the servant's point of view, since it would inevitably result in depriving of a livelihood many afflicted persons who have no choice but to labor, and who are impelled by experience or necessity to choose the more lucrative, if more dangerous, employment.

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**Cleanliness Now Cheaper Than Chemicals.**—The European war sent the prices of benzoates from about 18 cents per pound to $2.00 per pound and then food manufacturers who claim we could not get along without benzoates, at once seem to have made a new discovery that after all benzoates are not necessary—sterilization is a cheaper food preservative than benzoate at $2.00 per pound.—*N. Dak. Agric. Experiment Station Bull.*, September, 1915.

## Society Proceedings

### COMING MEETINGS

Am. Assn. for Study and Prevention of Inf. Mortality, Phila., Nov. 10-12.
Hawaiian Medical Society, Honolulu, Nov. 6-8.
Southern Medical Association, Dallas, Tex., Nov. 8-11.
Virginia State Medical Society, Richmond, Oct. 26-28.

### MEDICAL SOCIETY OF THE STATE OF PENNSYLVANIA

*Sixty-Fifth Annual Meeting, held in Philadelphia, Sept. 20-25, 1915*

*(Continued from page 1401)*

#### Treatment of Empyema

DR. EDWARD MARTIN, Philadelphia: In order to avoid infection from the skin, a puncture is made through the skin, deep fascia and into the muscle by means of a cataract knife. The trocar is pushed into the pleural cavity, and stopped when the resistance of the chest wall is no longer felt. The location of the pus thus having been determined, an incision 1½ inches long is made through the skin and a large trocar thrust into the pus cavity. The stylet is removed and a silver tube is passed through the cannula. The cannula is then withdrawn and the flanges of a tube are stitched to the skin by means of silver wire. The silver is not irritating to the tissues, and provides against compression or kinking, as is the case with a rubber tube. If necessary, a cupping glass or suction apparatus can be applied intermittently to produce negative pressure. Pulmonary exercises are to be instituted early. A dressing dampened with mild antiseptic solution is applied over the tube. If there is much adhesion between the pleural layers, these should be freed through a large incision in the intercostal space.

DISCUSSION

DR. JOHN H. JOPSON, Philadelphia: My own practice has been in favor of the ordinary methods of drainage and the following of Richardson's advice to make large holes. We can do this operation early and painlessly on a child if we will carefully and systematically anesthetize everything down to the pleura. I believe we should do this under general anesthesia, local anesthesia being used only if the patient is in bad condition. I like to get a look in the chest and free light adhesions in the lungs in the early stage and remove large loose masses of lymph which will clog any tube and will probably break down and disintegrate. If one can do that and introduce the tube Dr. Martin advises, we are making a great advance.

DR. JOHN D. SINGLEY, Pittsburgh: As regards breathing exercises in these cases of empyema, it has been my custom for years to have the patients use an ordinary football to blow into. The amount of pressure is limited only by the will of the patient, and it can be carried outdoors, where we like to keep these patients most of the time.

#### Treatment of Puerperal Infection and Septic Abortion

DR. JOHN M. FISHER, Philadelphia: In cases of puerperal sepsis, the severity of the infection with the same microorganism, even, varies in type from the most malignant, fatal in a few hours, to a type with symptoms so mild that in the absence of extraordinary precautions it may escape detection. I still believe alcohol to be of service in the treatment of profound toxemia characterized by feebleness of heart action, depression of the nervous centers, and the so-called typhoid states with either high or low temperature. The importance of eliminating toxic products through the excretory canals cannot be too strongly emphasized. The influence that the ingestion of water exercises on the skin and kidney is well understood. By whatever method administered it adds to the volume of the circulation, raises blood pressure, improves the quality of the heart's action, promotes nutritive changes incident to constructive and destructive metamorphosis, dilutes toxic products and promotes their elimination by its stimulating action on the kidney structure. The profession

has been slow in estimating the value of outdoor life in tents or porches in the care of patients suffering from puerperal and other forms of sepsis. By the open-air treatment is meant the actual outdoor exposure of the patient and not merely her removal to a sun parlor or veranda with closed sides.

### Treatment of Cancer by the Use of Radium in Conjunction with Surgery

DR. GUY C. BOUGHTON, Erie: Most of the cases of cancer in which radium treatment has been used have been inoperable cases; many of the patients have been almost moribund, and in this type of cases radium treatment has achieved what no other treatment could do. We would not replace surgery by radium therapy, but rather, by combination with radium therapy, make surgery more effective. The surgeon can remove the greater part of the malignant tissue, but the radium rays in suitable cases can go in and destroy all of the remaining malignant cells. In the treatment of even inoperable superficial cancers, carcinoma of the uterus, the prostate, the rectum and the breast, and in spindle-cell round-cell sarcoma, lymphosarcoma and rodent ulcers, radium has been shown to be of definite value.

### Surgical Treatment for Absent Vagina

DR. E. E. MONTGOMERY, Philadelphia: I advise such patients not to have the operation but to accept the situation and give up the idea of marriage. Where conditions seem to make it desirable that a vagina should be constructed, it is important that it should have a lining of mucous membrane. The best plan is to line the constructed canal with a section of the intestine, utilizing a portion of either the ileum or the rectum. I prefer the latter. The lower end of the rectum above the sphincter is utilized for the vagina, and the rectal canal is reconstructed by loosening the rectum and bringing it down and making an anastomosis at the anus.

### Treatment of Undescended Testes

DR. JOHN H. GIBBON, Philadelphia: In the early months and years of life, the mother or nurse should be instructed to draw down gently and push the testicle toward the bottom of the scrotum. If this fails by the third or fourth year, the Bevan operation should be performed. I have done this operation twenty-two times and have been surprised at the facility with which the organ can be carried into the scrotum. Eight of my patients were over 18 years of age.

#### DISCUSSION

DR. R. G. LE CONTE, Philadelphia: I am entirely in accord with the views expressed by Dr. Gibbon, but the manipulations for relief of the condition in infancy should be carried out very gently, or more harm than good may be done.

### Free Transplantation of Fascia Lata in the Treatment of Inguinal Hernia

DR. FRANCIS T. STEWART, Philadelphia: The free transplantation of fascia has proved to be almost uniformly successful, and for the very reasons that were thought to render fascia unsuitable for transplantation: its poor nourishment and its lowly situation in the scale of organized tissues. This method is especially called for when the hernia is large, recurrent, sliding or direct. The best place from which to obtain the fascia is from the region just below the outer portion of Poupart's ligament. After undermining the lower edge of the skin incision for exposing the inguinal canal, the transplant is immediately sutured with catgut to the under surface of the everted margins of the transversalis fascia. The edges of this fascia are then united over the transplant.

#### DISCUSSION

DR. J. S. RODMAN, Philadelphia: The recurrent cases of inguinal hernia are the most troublesome, and it is here especially that the use of some material to strengthen the abdominal wall would seem to be called for. I believe that Dr. Stewart has chosen the best material of all to transplant. In operating for recurrence, the most difficult problem is to restore the anatomy to something approximating the normal. This can usually be done with the Bassini technic, and, if transplantation is added to this, it will suffice to cure the majority of such patients.

### Preliminary Report of a New Method of Treating Gonococcic Virulent Conjunctivitis by Iced Normal Salt Solution

DR. EDWARD B. HECKEL, Pittsburgh: Ice pads have long been used in treating this malady on the theory that cold would inhibit the bacterial growth. In view of this and the assumption that gonococci are found only in superficial tissues, I have used iced normal salt solution in a few cases, and firmly believe that we have in it a specific in the treatment of gonococcal conjunctivitis. It is a harmless, effective germicide, easily applied, and well borne by the patients.

### Pregnancy and Tuberculosis

DR. CHARLES C. NORRIS, Philadelphia: Two years ago Dr. C. S. Bacon of Chicago estimated that there were in the United States alone 32,000 tuberculous women who became pregnant annually. Whether or not the normal pregnant woman is more susceptible to infection by the tubercle bacilli than her nonpregnant sister is still an undetermined point. The combined statistics of Fishberg, Funk, Jacob, Panwitz and a number of other observers in more than 1,100 cases give the proportion of women believing their infections to have originated during pregnancy or the puerperium as 39 per cent. While it is admitted that pregnancy exerts an unfavorable influence on tuberculosis, no hard and fast rule can be made, but each case must be individualized. Marriage should be advised against in the presence of an active lesion. A hard and fast rule that a tuberculous woman should not marry is too sweeping, although as a general principle this advice is correct. In cases in which conception has been countenanced, especial hygienic surroundings must be enforced, and frequent examinations should be made by an internist. In the cases of pregnancy in the presence of an extensive tuberculous lesion, even in the quiescent stage or small active lesion prior to the fifth month, the uterus should be emptied at once. This applies also when laryngeal or other secondary lesions are present. During the first six or seven weeks of pregnancy, dilatation and curettage is the operation of choice; beyond this period, vaginal hysterotomy. Practically all authorities agree that nothing is to be gained by operative intervention during the last four or five months of pregnancy. The indications, which are for treatment along general lines, should in cases of advanced tuberculosis be directed especially to obtaining a living child. A much more difficult problem is presented by the woman with a quiescent lesion of moderate extent. While it is accepted that continuance of the pregnancy is an added risk, abortion is not justifiable in every case. The patient should be studied closely and a guarded prognosis given.

#### DISCUSSION

DR. H. R. M. LANDIS, Philadelphia: While a very considerable number of tuberculous women state that the first manifestation of the disease has occurred during pregnancy, I doubt whether any such instance is one of primary infection, but one rather of quiescent tuberculosis in which the added stress of pregnancy has lighted up the process. I have known of instances in which women after six or seven years of sterility have become pregnant, after recovery from an attack of incipient tuberculosis, without recurrence of the disease. I am opposed to the legislation advised by eugenists against the marriage of all infected persons.

DR. ALEXANDER ARMSTRONG, White Haven: It is my custom to advise against the tuberculous woman bearing children until after at least five years of health. This opinion applies also to the question of marriage.

DR. ELMER H. FUNK, Philadelphia: In a series of 100 tuberculous women studied at the Jefferson Hospital, forty-three showed definite lesions dating from the beginning of pregnancy and during the puerperium. Termination of pregnancy in the earlier months gave better results than when gestation was allowed to proceed.

### An Unappreciated Form of Pneumothorax

Dr. Charles Rea, York: By the "unappreciated form of pneumothorax" is meant that form coming on suddenly without obvious evidence of illness. The condition is regarded as due to rupture of air vesicles from a tearing of the pleura, probably always due to a previous pleurisy resulting in an adherence of the two surfaces. Its frequency is greater than is generally supposed. Differential diagnosis is of interest so far as extreme emphysema is concerned. General care is practically all the treatment required. Unnecessary muscular effort should be avoided until absorption of the air and obliteration of the rent have taken place. While in the majority of cases prognosis is excellent, cases have been reported in which absorption of the air had not taken place for many years. Pulmonary tuberculosis has occurred in several instances.

### Therapeutic Pneumothorax in Pulmonary Tuberculosis

Dr. Alexander Armstrong, White Haven: This method of treatment has been used at White Haven for three years. The procedure consists in the introduction of gas, preferably nitrogen, into the pleural sac, compressing and eventually collapsing the affected lobe or lung. Strict asepsis is to be enjoined throughout the operation. While the lung is usually kept under compression for six months, in some cases a much longer time is essential. The rationale of the measure is to lessen expansion of the alveolar tissue and to encourage drainage of septic matter. Three indications for the treatment are: (1) progressive softening in one or more lobes of one lung, the other lung being normal; (2) relief of hemorrhage; (3) pleurisy, either dry or with effusion. A careful selection of cases is advisable, but it is not essential that treatment be restricted to those in which the disease is unilateral. In view of our results, we believe that therapeutic pneumothorax has a fixed place in the treatment of pulmonary tuberculosis.

DISCUSSION

Dr. Charles M. Montgomery, Philadelphia: I believe the cases referred to by Dr. Rea as "unappreciated pneumothorax" are not recognized as promptly as they should be, although the physical signs are sufficiently plain to be known. A number of cases have been recognized only by the Roentgen ray. Regarding pneumothorax, I know of no more encouraging report in literature. My only fear is that the impression may be received that the procedure is a simple one. It should be emphasized that its employment should be limited to experts in the work.

Dr. Isadore Kaufman, Philadelphia: A very large percentage of the cases mentioned by Dr. Rea develop in only phthisical subjects. As to therapeutic pneumothorax, I would emphasize the employment of the procedure in the earlier cases.

### Case of Cholesteatoma of the Spinal Cord

Dr. William Egbert Robertson and Dr. Samuel D. Ingham, Philadelphia: A girl was taken from school when 15 years of age because of increasing languor and anemia. She was first seen, Dec. 28, 1914. There were progressive loss of flesh, intermittent insomnia, motor and sensory disturbance of the left leg, later of the right, variable in character, obstinate constipation and involvement of the bladder, with marked cystitis and a mixed spastic and steppage gait. At operation, a tumor 5½ inches long was removed, which on microscopic examination proved to be a cholesteatoma. The patient has gained 25 pounds in weight. There is still moderate foot drop in the left leg with a little anesthesia and loss of muscle sense. There is, however, considerable gain in power, with increased size of the left leg, and the gait is almost normal.

### Value of the Psychopathic Hospital

Dr. Daniel J. McCarthy, Philadelphia: Within recent years the psychiatrist and neurologist have felt the necessity of a fuller and better equipment for the care, study and prevention of mental diseases. There probably has been no greater blot on the art of medicine than the care and treatment of the insane during a period when in every other direction medicine was advancing. Effort has been directed largely to administration and custodial care of the patient rather than to the scientific study of the cause of mental diseases. Two problems facing the state are the immediate care of large numbers of insane, and the ever-increasing number of those requiring such provision. Insanity is a problem not only of the brain tissues but also of the entire economy. The psychopathic hospital should not, therefore, differ from the most advanced hospital connected with medical schools, and should be divided into the clearing house type for (1) the reception and distribution of cases; (2) the investigation of cases, and (3) the cure of borderline cases. There should be facilities in every general hospital for the temporary care of all mental cases. We should have institutions receiving not only wards of the state but also patients able to pay partial or full fees.

DISCUSSION

Dr. James Hendrie Lloyd, Philadelphia: The term "psychopathic hospital" has come to be a favorite one at the present time and one much used by persons of an optimistic turn of mind. It is meant to note progress, and is used to signify an institution different and theoretically better than that which is meant by the old-fashioned term "insane asylum." So far as the term means progress it is commendable. Progress does not, however, depend on mere words. A psychopathic hospital is, after all, nothing but a hospital for the study and treatment of the insane; one should not be deceived by a name. The treatment of the insane should be practically the same in all hospitals. I believe that a large municipal hospital offers the equipment and facilities desirable for mental cases.

Dr. George E. Price, Philadelphia: I do not entirely agree with Dr. Lloyd that the psychopathic hospital should be entirely under the care of the municipality. The great difficulty in the present situation is that people of moderate means have no hospital to which they can go, but to the municipal hospital at Blockley. Every large hospital, particularly those connected with the teaching institutions, should make provision for the mentally sick, just as they would for the man with an acute pneumonia or nephritis.

Dr. Alfred Gordon, Philadelphia: There should be a place for those persons, not insane in the true sense of the word, yet not normal mentally. Such persons, though free from delusions and capable of reasoning, are in a state of mental disquietude and cause much anxiety to their friends. For these I feel very strongly that there should be a place between the general hospital and the hospital for the truly insane. In spite of the later teaching, a stigma attaches to the placing of a patient in an insane asylum.

*(To be continued)*

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## KENTUCKY STATE MEDICAL ASSOCIATION

*Sixty-Fifth Annual Meeting, held at Louisville, Sept. 21-23, 1915*

*(Concluded from page 1398)*

### Diagnosis and Treatment of Gastric and Duodenal Ulcers

Dr. J. G. McClymonds, Lexington: The decision to operate more frequently rests with the internist and with the surgeon. As a rule, there should be no disagreement. Those cases with organic pyloric stenosis, hour-glass contractions, or perforations come definitely under surgical treatment. To these we must add cases in which repeated hemorrhages occur or relapses after apparent cure persist. Again, in those cases in which improvement is slow or arrested from inability to take sufficient nourishment, surgical intervention should be considered before the patient has reached a stage of exhaustion in which surgery would be a last resort.

### Digitalis: Its Indication and Manner of Use

Dr. W. W. Anderson, Newport: Next to auricular fibrillation and flutter, the occasion of highest usefulness for digitalis is in acute cardiac dilatation. This occurs whenever the heart is subjected to a too great strain without time

for hypertrophy. Thus it may result from a wrestling match, a marathon race, or pumping the blood against the constriction of asthma, emphysema or pneumonia. In the last instance dilatation is favored by the toxic degeneration of the myocardium. The effect of digitalis in these cases is most satisfactory. Too many of us have been giving digitalis in every case in which a heart murmur could be detected. The drug is worse than useless in true valve disease unless compensation is broken. Digitalis in therapeutic doses has no effect on the normal heart. A heart fully compensating for an impaired valve is a normal heart for present purposes of circulation, and needs no medicine. The tincture and fluid-extract are not to be compared with like preparations of other drugs for stability. If fairly fresh they represent the whole drug. The fresh infusion represents all the nastiness and most of the virtues of digitalis, but is worthless in two days. Not one of the so-called active principles, even at its best, represents the whole drug. Most of them as found in the shops are worthless. They have only the advantage of fitness for hypodermic use even when right. All active preparations of the drug tend to disturb digestion. I cannot agree with those distinguished authorities who assert that this disturbance all comes through the vomiting center, some even adding that it proves overdosing and that digitalis is not a local irritant to the stomach. If their contention were true, there would be no advantage in giving the drug by the rectum. By giving from one third to one half more by rectum, digestion is often spared and full therapeutic effect obtained. The approach of toxic symptoms may be noted in gastric irritation (hunger, pain, weight and pressure soreness) and in slow pulse. Both these effects are in part overcome by combining the drug with atropin, but this combination is liable greatly to increase blood pressure. Coupled rhythm or bigeminal pulse is the danger signal that should mean instant discontinuance of digitalis.

### Gastric and Duodenal Ulcer; Surgical

DR. MICHAEL CASPER, Louisville: The chief danger of gastric ulcers are: first, hemorrhage; second, perforation; third, cancer formation; fourth, stenosis, if in the pyloric region. Other dangers exist, such as malnutrition and chronic invalidism, which naturally predispose to other intercurrent diseases. Gastrojejunostomy is the recognized operation for gastric ulcer with excision of the ulcer. Recently Balfour's method of cautery puncture has met warm approval. All gastric ulcers should be excised or destroyed by cautery, because of cancer menace. This disputed point is about settled now, and the only question that remains is what proportion of cancers of the stomach are preceded by ulcer period. Gastrojejunostomy does most good, of course, in ulcer of the pyloric region on account of improved drainage. The causes of failure in gastrojejunostomy are: first, vicious circle; second, narrowing or closing of anastomotic opening; third, jejunal ulcer; fourth, persisting irritation of nonabsorbable inner suture; fifth, jejunal or gastrojejunal ulcer. Nearly all of these are obviated by the more improved technic of posterior, no-loop gastrojejunostomy, absorbable inner through-and-through suture being used and otherwise careful manipulation of anastomotic structures. The final results of operative procedure in gastric and duodenal ulcers compare favorably with operation on the gallbladder and appendix. The mortality is likewise reasonably low, and is being constantly lowered. We cannot too strongly emphasize the hearty cooperation of the internist and the surgeon in this class of work, not only prior to but after operation as well.

### Verumontanum with Reference to Referred Symptoms

DR. GEORGE H. DAY, Louisville: The etiology of these conditions discloses some very interesting information. In our series of nearly 200 cases, only about 80 per cent. gave the history of a preceding gonorrhea; 20 per cent. were found in men with a negative venereal history. In the gonorrheal type, a large majority had a complicating infection of the prostate and seminal vesicles, some singly and some both. Again, quite a number were observed with a history of an infection years previously and absolutely clear urine, normal vesicle and prostate, with an enormous tender verumontanum, together with resulting neurotic symptoms. In the acute or subacute infectious types the verumontanum takes a many-sided picture of pathologic changes. The sinus pocularis in these cases is usually widely gaping, simulating closely the existing anatomic changes, as attends the urethral orifices in a kidney infection. The causes of these conditions are divided naturally into those giving a history of a previous infection and those with a negative venereal history. It is in the cases with a negative venereal history that the best results are noted. The open air endoscope offers a useful place in the treatment of these disorders, and, while a great many drugs have been suggested, in my hands silver nitrate in varying solutions has been the agent *par excellence*. It has been my habit after thoroughly drying the verumontanum and adjacent tissues with dry applicators to apply varying strengths of silver, either 10, 20, 30 or 50 per cent., as is tolerated by the patient. It is necessarily wise to suggest that the treatment is rather painful and the reaction from the silver at times rather severe, but with a proper selection of cases and the solutions discriminately applied, amazing results are usually obtained. It is my habit to apply them at weekly intervals over a period of more or less length of time. It is wise after the application of the silver to allow it to dry thoroughly. The excess is always to be removed, before the endoscope is withdrawn.

## *Current Medical Literature*

### AMERICAN

Titles marked with an asterisk (*) are abstracted below.

#### American Journal of Diseases of Children, Chicago

*October, X, No. 4, pp. 229-312*

1 *Chemical Study of Woman's Milk, Especially Its Inorganic Constituents. L. E. Holt, A. M. Courtney and H. L. Fales, New York.
2 *Studies in Adaptation of Artificial Food to Human Milk. H. J. Gerstenberger, H. D. Haskins, H. H. McGregor and H. O. Ruh, Cleveland.
3 *Extensive Purpuric Eruptions in Epidemic Meningitis. E. A. Morgan, New York.
4 *Tonsillar Manifestations in Early Diagnosis of Measles. C. Herrman, New York.
5 Total Nonprotein Nitrogen and Urea of Blood and Phenolsulphonephthalein Excretion in Children. W. Tileston and C. W. Comfort, New Haven, Conn.
6 *Atropin Treatment for Exudative Diathesis in Infancy. J. S. Leopold, New York.

1. **Study of Woman's Milk.**—In the colostrum period woman's milk, according to the authors, has high protein and high ash with rather low fat; in the transition period the protein and ash are lower while the fat is higher; in the mature period (after one month) the composition of normal milk does not vary in any essential or constant way quite up to the end of lactation. The only striking feature of late milk is a decline in quantity, though there is noted a slight fall in all the solid constituents except the sugar. Of the different constituents of milk the least variation both in individuals and in periods is seen in the sugar. The proportion of this is somewhat higher than the generally accepted 7 per cent.; 7.5 per cent. is nearer the correct figure. The greatest individual variations are seen in the fat, though the period variations in fat are not marked. The protein is highest in the colostrum period and falls to a little over half the proportion in mature milk, during which period it is seldom over 1.25 per cent.; of this about one-third is casein, and two-thirds lactalbumin.

The high ash of the colostrum period is chiefly due to the amount of $Na_2O$ and $K_2O$. Of the salts which make up the ash, the greatest individual, as well as the greatest period, variations are seen in the $Na_2O$; the least individual and period variations are seen in the CaO, the proportion of which is nearly constant throughout the period of lactation. The largest constituent of the ash of woman's milk is $K_2O$; this with the CaO together make up more than half the total ash.

Although in amount the total ash of cow's milk is about three and one-half times as great as that of woman's milk, the proportion of different salts which make up the ash is nearly the same, the only exceptions being that cow's milk has more $P_2O_5$ and less iron.

2. **Artificial Milk.**—By mixing varying proportions of different animal and vegetable fats Gerstenberger and his associates found that it is possible to get a fat that in its Reichert-Meissl number (small per cent. of low volatile fatty acid glycerids), saponification number, iodin number, and other characters, is nearly identical with the fat of human milk, as has previously been shown by Arnold. By replacing in an artificial milk cow's-milk fat with the fat of the above description in an emulsified state (homogenized), a distinct step in advance toward the more complete adaptation of an artificial food to breast milk is made. It is also possible to take into consideration the "growth factors," "vitamine factors," and the like, in choosing the individual fats for an acceptable mixture. This represents a further step in the more complete adaptation of an artificial milk to human milk. The homogenizer represents the important means by which the mixing and emulsification of the fat in the artificial milk is possible. The homogenizer also changes the physical condition of the fat (smaller globules, brownian movement), which may be of advantage.

The meager clinical data suffice to show that the infants fed with Friedenthal's milk in which the cow's-milk fat has been replaced by a fat with a low volatile fatty acid glycerid content, similar to that of human milk fat, vomit less and have more normal stools than the children reported by Bahrdt, and fed with Friedenthal's milk containing unchanged cow's-milk fat. Washing butter with cold or hot water does not remove the low volatile fatty acids from butter, except in an insignificant degree. Washing butter with hot alcohol does remove the low fatty acid glycerids to a decided degree. The manufacture of a food like G-R milk can be arranged to give a very low bacteriologic count. The production of milk like G-R milk can be made at a reasonable cost.

3. **Purpura in Meningitis.**—The unusual features of the two cases cited by Morgan were: 1. The character and distribution of the eruption, which was unlike the usual purpura hemorrhagica and which though differing greatly in degree was almost identical in both patients. 2. Paucity of other meningeal signs, such as opisthotonos and other manifestations of increased muscle spasm. 3. Demonstration of the specific organism in the blood of both patients, though attempts to grow the same organism from the skin lesions were unsuccessful. 4. Refutation of the old theory that the extent and color of the eruption was of prognostic aid. In both the above cases the meningeal manifestations were no more marked than usual, and were quite amenable to treatment. 5. Both cases were sporadic as far as could be learned by investigation of the locality and by a study of the Board of Health daily bulletin.

4. **Tonsillar Spots in Measles.**—Tonsillar spots in measles were observed by Herrman in thirty-five cases (40 per cent. of the eighty-eight cases examined). In 9 patients they were present one day before the eruption appeared; in 11 patients two days, in 7 patients three days, in 5 four days, in 2 six days, in 1 nine days before the eruption appeared. In 30 of the 35 patients Koplik's spots were observed, in 14 patients one day before the eruption appeared, in 15 two days, in 1 three days before the eruption appeared. In 13 patients the tonsillar spots were seen one day before Koplik's spots; in 3 two days, in 2 three days, in 1 four days, in 1 seven days before Koplik's spots. In 5 patients the Koplik's spots were seen 1 day before the tonsillar; in 5 patients the Koplik's spots were seen on the same day as the tonsillar spots, and in 5 patients the Koplik's spots were not seen, so that the interval could not be determined. In 12 patients the spots were visible for one day; in 17 two days, in 6 for three days. At the time when the spots were first seen, the temperature was less than 100 in 6 patients, between 100 and 100.5 in 6, between 100.5 and 101 in 3, between 101 and 101.5 in 8, between 101.5 and 102 in 2, between 102 and 102.5 in 7, between 102.5 and 103 in 1, and between 103 and 103.5 in 2 patients.

6. **Exudative Diathesis.**—During the past year Leopold has administered the atropin treatment to ten infants suffering from symptoms of the exudative diathesis—severe eczema, bronchitis or asthma. Mild cases were not treated. The patients were all institutional babies ranging in age from 4 months to 2 years, and were under constant medical supervision. The results of the atropin treatment on the lesions of the exudative diathesis were excellent; and this despite the fact that no changes in diet were made, and no other drugs administered. One infant died during the period of observation. In this patient atropin had a beneficial effect on the eczema, but in no wise influenced the pulmonary condition, death following a terminal bronchopneumonia.

Atropin was used in a solution of 1 grain of atropin sulphate to 480 drops of water. Three drops of this solution were given on the first day of treatment, and if no untoward effects were observed, the dose was increased 1 drop daily until patients received about 30 drops daily (equivalent to 1/16 grain of atropin sulphate). This last dose was given daily for one or more weeks until the manifest signs of the exudative diathesis had disappeared. Smaller doses were then administered for a few more days or weeks. In only one case did untoward manifestations appear; they were very mild, and did not recur after the initial dose of the atropin solution had been reduced. In no case was there any harmful result from the atropin treatment. It was clearly evident from the beginning that infants suffering from exudative diathesis were able to take large doses of atropin sulphate without showing toxic effects.

**American Journal of Obstetrics and Diseases of Women and Children, York, Pa.**

*September, LXXII, No. 3, pp. 385-576*

7 Need of Instructors and Inspectors as Hospital Officers. R. L. Dickinson, Brooklyn.
8 Roentgen Ray Treatment of Uterine Fibroids. S. Stern, New York.
9 *Choice between Operation and Roentgenization of Uterine Fibroids. R. T. Frank, New York.
10 *Modification of Technic of Abdominal Cesarean Section. W. M. Brown, Rochester, N. Y.
11 *Contracted Pelvis and Difficult Labor. M. Hornstein, New York.
12 Carcinoma Uteri. L. W. Strong, New York.
13 Mentally Backward Child from Standpoint of Neurologist. M. Neustaedter, New York.

9. **Operation of Uterine Fibroids.**—Frank claims that the Roentgen ray cannot be used with safety: In rapidly growing tumors; in cases of metrorrhagia in which complete preliminary curettage with microscopic examination of the curettings is not feasible; in complicated cases in which ovarian cysts or serious adnexal trouble cannot be excluded; in fibroids complicating pregnancy. The rays should not be used in cases in which expense is a factor or in cases in which time is a factor. The rays are of chief value in cases in which operation is declined, in cases in which operation is contraindicated by serious heart, renal or pulmonary lesions, or in cases in which operation is contraindicated because of extreme psychical unrest. Consequently Roentgen-ray treatment is applicable to at the most 5 to 6 per cent. of all patients having fibroids.

10. **Abdominal Cesarean Section.**—A slight modification of the Davis operation is practiced by Brown. He makes the incision in the usual manner, about 10 cm. long and entirely above the umbilicus, if possible. By pressure on the sides of the abdomen an assistant holds the uterus firmly up against the abdominal incision while the cut in the uterus is being made. When the uterus has been carefully opened, and before the child is delivered, the uterine cut is sewed to the abdominal wound either with eight or ten interrupted sutures, or possibly by a continuous suture. The uterus is then emptied of child, placenta and membranes. It is impossible for the uterine viscera to get into the peritoneal cavity or for the abdominal contents to get into the way of the operator. In closing this

incision Brown finds that it is quite easy to place the whole of the first row of uterine muscle sutures before the temporary sutures are removed. By leaving the permanent sutures in the upper and lower angles of the incision long they are convenient for holding the uterus up in view while the last stitches are being taken. Brown has used this method now in four cases.

11. **Contracted Pelvis and Difficult Labor.**—Small external measurements when they are all proportional with an external conjugate of 15 cm. or over, provided they are found in a woman whose slender build accounts for a small pelvis, Hornstein insists deserve a fair test of labor. They usually have small children and will deliver spontaneously if the fetus presents favorably. A fair test of labor in a doubtful case and especially in a primipara must include a period of four to six hours in active labor with the membranes ruptured, although as a rule, three hours will decide the outcome. Cesarean section for relative contraction in a primipara, means repeated cesarean for subsequent children, whereas extraction of the child through nature's passages, even if it should result in a stillbirth, will enable the woman to deliver her subsequent children per viam naturalem, since a good deal of resistance which is encountered in primiparae is due to the soft parts.

### American Journal of Physiology, Baltimore

*October, XXXVIII, No. 4, pp. 415-494*

14 *Studies in Experimental Glycosuria. Level of Blood Sugar in Dog Under Laboratory Conditions. J. J. R. Macleod and R. G. Pearce, Cleveland.
15 *Id. Sugar Retaining Power of Liver in Relationship to Amount of Glycogen Already Present in Organ. J. J. R. Macleod and R. G. Pearce, Cleveland.
16 *Differential Effects of Epinephrin on Splanchnic and Peripheral Arteries. F. A. Hartman, Boston.
17 Osmotic Properties of Calcium and Magnesium Phosphate in Relation to Those of Living Cells. E. B. Meigs, Philadelphia.

14. **Level of Blood Sugar in Dog.**—Macleod and Pearce point out that although the blood sugar level in an anesthetized animal does not remain unchanged from time to time, yet the changes occurring during a period of ten minutes are small when compared with those observed on blood similarly removed from animals in which the splanchnic or hepatic nerves were stimulated.

15. **Influence of Glycogen on Sugar Storage of Liver.**—Briefly summarized, the authors' experiments showed that the existing glycogen content of the liver does not demonstrably influence the rate with which this organ removes dextrose from the blood of the portal vein. The following points were noted: 1. The quicker rise in sugar concentration in the portal blood than in that of the vena cava. 2. The delay, after discontinuing the injection, in the return to the normal level of the sugar concentration of the blood of the vena cava and frequently also in that of the portal vein.

16. **Effect of Epinephrin on Splanchnic and Peripheral Arteries.**—Hartman found that dilute epinephrin slowly injected caused a fall in general blood pressure in forty-eight out of fifty-three animals tried. Three of the animals in which a fall did not occur, were in poor physical condition and one was just recovering from the effects of alcohol. Dilute epinephrin caused dilatation of the peripheral arteries even after extremely low pressures had been produced by hemorrhage. The same dose of epinephrin caused constriction of the splanchnic arteries. When the blood pressure was lowered by depressor stimulation, the same dose of epinephrin caused a fall, a rise and fall or a pure rise, depending somewhat on the height of the pressure. The average latent period for the peripheral fall in the blood pressure (from doses of 0.2 c.c. epinephrin, 1:100,000) was 15.7 seconds; the latent period for the splanchnic rise was 18.6 seconds. The duration of the splanchnic rise was 37.8 seconds, while the duration of the peripheral fall was fifty-nine seconds. The threshold for the change of a fall to a rise in the peripheral arteries, when epinephrin was injected (in three animals only) over a period of from ten to twenty seconds, was betweetn 0.1 and 0.3 c.c. of a 1:10,000 solution. Large doses of ergotoxin phosphate inhibit the splanchnic response to dilute epinephrin. The existence of sympathetic vasodilator nerves in the peripheral arteries and their absence in the splanchnic arteries would account for the opposed action of like doses of dilute epinephrin on the peripheral and splanchnic arteries.

### Boston Medical and Surgical Journal

*October 7, CLXXIII, No. 15, pp. 527-564*

18 *Our Criminal Problem from Standpoint of Classification and Segregation. E. R. Spaulding, Framingham.
19 *Blood Pressure Determinations, Urinary Findings and Differential Blood Counts in Group of Young Male Adults. R. I. Lee, Boston.
20 *Gastric and Duodenal Ulcers. C. Graham, Rochester, Minn.
21 Use of Calcium in Treatment of Epilepsy. J. Bryant, Boston.
22 Synchronous Inspiration and Systole in Patient Exhibiting Equal Respiratory and Pulse Rates. P. D. White, Boston.

18. **Criminal Problem.**—If the criminal problem is one of treatment of the individual for his deficiencies rather than of punishment for the crime committed, Spaulding says that the following fundamental provisions for the administration of such treatment are necessary: 1. Adequate provision by the state for the permanent custodial care of all committable cases of mental defect, whether or not they have a court record. 2. The establishment of laboratories in their courts and correctional institutions for the study and diagnosis of all offenders. The equipment of all their institutions with facilities for classification and treatment of the various types which will remain even after the removal of the most defective. Such a classification will necessitate separate buildings, at least one of which should be equipped for hydrotherapy. The adoption of an indeterminate sentence, which shall enable us to treat patients until they are able to return with safety to the community. The physician has it in his power to do much toward educating the public to the need of fundamental measures of reform and toward counteracting the tendency toward superficiality of some enthusiastic believers in universal reform. His knowledge of mental and physical defect enables one to see more than the cross section of the subject, which is represented by the population at present confined in their penal institutions, and to appreciate the social and economic waste which is the result of their past neglect of generations of inefficients in the community.

19. **Blood Pressure Determinations.**—Lee examined 662 normal young men, the average age 18, average height 5 feet 8 inches, average weight without clothes, 143 pounds. The average systolic pressure was approximately 120 mm. of mercury; the average diastolic pressure 80 mm. Eighty-five, or 12.8 per cent., of the 662 presented systolic blood pressure readings over 140. The highest reading was 180. The diastolic pressures were found to be much more uniform. There was comparatively little variation between the readings in the recumbent and standing positions. The average was 80. Only five cases had a diastolic blood pressure over 100. All these five cases presented systolic blood pressures over 140, but only one of them presented a systolic pressure over 160. Of the five who presented diastolic blood pressures over 100, no other abnormality was found in three patients.

Of this group of eighty-five cases, 9 (or 10.5 per cent.) showed albuminuria. The percentage of albuminuria in the total 662 men was 5.1 per cent. In only one case with albuminuria was the systolic pressure in either the standing or recumbent position over 160. In seven of the eighty-six cases, a definite valvular lesion of the heart was found. One of these patients also presented albuminuria. In one patient a slight goiter was present. Another case of obesity presented a persistently high blood pressure. Five patients showed sugar in the urine; in two patients the sugar immediately cleared up and has not reappeared. Blood smears were made in every case. Only five patients presented a polynuclear leukocytosis of over 75 per cent. Only four patients showed an eosinophilia of over 5 per cent.; the reasons for these were not apparent. Seventy-three patients showed a lymphocytosis of over 50 per cent., but in no instance was the lymphocytosis over 60 per cent. In 153

cases the lymphocytes were between 40 and 50 per cent. of the white cells. In other words, 231 of the 564 cases showed a lymphocyte count between 40 and 50 per cent. The red cells were essentially normal in every case.

20. **Gastric and Duodenal Ulcers.**—According to Graham 72 per cent. of duodenal cases seen at the Mayo clinic in the past nine years gave fairly regular symptoms and 71 per cent. of gastric cases gave the expected syndrome, or were so clearly gastric that little hesitancy was felt in making a diagnosis. Pain is the one constant diagnostic factor in all peptic ulcers. Less than 1 per cent. of patients are recorded free from pain. The time of pain has some distinctive diagnostic significance. In the duodenal ulcers the pain came one-half to two hours after food in 23 per cent. of cases, and two to five hours in 77 per cent. of the cases. In gastric ulcers the time limits of one-half to two hours included 50 per cent. and two to five hours an equal number. In 20 per cent. of the duodenal and in 19 per cent. of the gastric ulcers the time of pain was not recorded. Eight per cent. of the patients with duodenal ulcer and 19 per cent. with gastric ulcer had pain within one-half to one hour after eating.

Pain at night appeared to be more decidedly frequent in duodenal ulcer, while ease from posture (lying down) seemed decidedly more frequent in gastric ulcer. However, the final analysis gives 14 per cent. of the patients with duodenal ulcer and 10 per cent. of those with gastric ulcer having pain at night. Postural ease was noted in 8 per cent. of the duodenal and in 9 per cent. of the gastric cases. These figures correspond much more closely than one would suppose from impressions gained in history writing. Continuous pain from the beginning of symptoms was mentioned in 4 per cent. of the duodenal and 9.5 per cent. of the gastric cases. Tenderness to touch was recorded in 41 per cent. of the duodenal and 40 per cent. of the gastric histories. The location and radiation of pain was noted as follows: Of the duodenal ulcers 49 per cent. were well confined to the epigastrium, 52 per cent. of the gastric were similarly located. Those with radiation to the back ran 24 per cent. duodenal and 22 per cent. gastric. In the diagnosis gallstones were considered certain or were given first place in 13 per cent. of the duodenal and in 9 per cent. of the gastric cases. Radiation to the left epigastric area occurred twice as often in gastric (10 per cent.) as the duodenal cases (4 per cent.). The percentage of radiation to the abdomen and fossae was quite similar (9.5 per cent. duodenal, 9 per cent. gastric). Radiation to right epigastrium was present in 6.6 per cent. of the gastric and in 13.7 per cent. of the duodenal cases. Therefore, tenderness to touch, radiation of pain, and the patient's ability to locate his subjective pain gave little basis on which to arrive at a differentiation. Vomiting was recorded as occurring in 79 per cent. of the duodenal and in 82 per cent. of the gastric ulcers, while gas was present in 77 per cent. of the duodenal and in 94 per cent. of the gastric.

History of hemorrhages by mouth was recorded in 18.5 per cent. of duodenal and in 25 per cent. of gastric cases. Blood by the bowels was similarly recorded in 18 per cent. of duodenal and in 24 per cent. of gastric cases. Perforation ran about equal in both classes (duodenal 28.7 per cent., gastric 26 per cent.) and of those that perforated, the pancreas received the perforation in 17 per cent. of the duodenal and in 25 per cent. of the gastric cases. Pain to the back, which more or less simulated gallstones radiation, ran about equal (24 per cent. duodenal, 22 per cent. gastric) in two conditions, all cases considered.

### California State Journal of Medicine, San Francisco

*September, XIII, No. 9, pp. 333-374*

23 Typhoid. W. W. Behlow, Boston.
24 Statistics of My New Advancement Operation; Report of Cases. R. O'Connor, Oakland.
25 Diagnosis of Congenital Syphilis. H. H. Yerington, San Francisco.
26 Gastro-Intestinal Symptoms in Diseases of Circulatory System. W. W. Kerr, San Francisco.
27 *Benzene Treatment of Leukemia. W. W. Boardman, San Francisco.
28 Blood in Leukemia. H. R. Oliver, San Francisco.
29 Roentgen Ray Treatment of Leukemia. H. E. Ruggles, San Francisco.
30 Shall the Medical Society of State of California Have Examining Board? W. T. Barry, Santa Barbara.
31 Routine Examination in General Hospital for Diphtheria Carriers and Note on Schick Reaction. W. T. Cummins, P. K. Brown and C. L. Bittner, San Francisco.
32 Banti's Disease. H. H. Lissner, Los Angeles.

27. **Benzene Treatment in Leukemia.**—The principle of the treatment is considered sound by Boardman. He believes that with proper precautions, there is no appreciable danger in using benzol. The improvement is a real improvement and not due to accumulation of the leukocytes in the central vessels. The improvement is only temporary, as in their other methods of treatment. The treatment is applicable in all chronic cases of leukemia. Bronchitis and anemia cannot be considered contraindications. The presence of nephritis is a more serious complication and demands more careful consideration. The treatment is more readily administered and is less costly than the Roentgen ray and may be given to those unable to obtain Roentgen ray. The percentage of improvements is about the same under benzol as under Roentgen ray.

The drug is best administered in freshly filled gelatin capsules with an equal amount of olive oil; the maximum daily dose not to exceed 5 gm. The treatment must be carefully controlled by frequent blood and urine examinations and discontinued if there is evidence of kidney irritation, or when the leukocytes reach values of 25,000 to 20,000. The best results follow the combined benzol and Roentgen-ray treatment, the benzol effect apparently being increased by a preliminary Roentgen-ray treatment. Some cases will not respond to benzol in the usual dosage and in the usual time, and other patients are unable to take the drug owing to gastro-intestinal disturbances, etc. When carefully administered and carefully controlled, benzene is apparently a valuable addition to the methods of treating chronic leukemia.

### Illinois Medical Journal, Chicago

*September, XXVIII, No. 3, pp. 161-240*

33 Clinical Problems in Connection with Some of the Complications of Acute Otitis Media. G. E. Shambaugh, Chicago.
34 Sympathetic Ophthalmia; Report of Case. R. Blue, Chicago.
35 Non-Suppurative Sinus Disease in Relation to Eye. J. A. Cavanaugh, Chicago.
36 Blind Spot. S. Gradle, Chicago.
37 Syphilis of Internal Ear. G. H. Mundt, Chicago.
38 Foreign Bodies in Respiratory Tract. S. A. Friedberg, Chicago.
39 Focal Infections with Special Reference to Tonsil. F. Brawley, Chicago.
40 Diagnosis of Otosclerosis. G. W. Boot, Chicago.
41 Urinary Analysis in Treatment of Nephritis. B. G. R. Williams, Paris.
42 Congenital Hypertrophic Stenosis of Pylorus. F. B. Riley, Chicago.
43 Effects of Harrison Narcotic Law as Observed in Jacksonville State Hospital. T. G. McLin, Jacksonville.
44 Empyema, Thrombosis and Embolism with Sudden Death Following Laparotomy; Cases Reported. F. C. Schurmeier, Elgin.
45 Organization Crying Need of the Hour. L. G. Burroughs, Collinsville.
46 Agar Culture Medium. J. E. Huber, Peoria.

### Iowa State Medical Society Journal, Des Moines

*September, V, No. 9, pp. 351-390*

47 Etiologic Factors in Uveal Tract Diseases and General Examinations Required to Determine Their Presence and Decide on Treatment of Lesions They Produce. G. E. De Schweinitz, Philadelphia.
48 Early Acquired Spastic Paraplegia, Associated with Hypothyroidism and Ichthyosis; Report of Case. T. B. Throckmorton, Des Moines.
49 New Serum Treatment for Epilepsy. W. Held, Chicago.
50 Limitations of Surgery in Treatment of Pelvic Inflammations. P. Findley, Omaha.
51 Laboratory as Aid to Diagnosis. T. H. Glenn, Fort Dodge.

### Journal-Lancet, Minneapolis

*September 15, XXXV, No. 18, pp. 495-524*

52 Future of Minnesota State Board of Health. H. M. Bracken, St. Paul.
53 Some Impressions on Goiter Question. R. H. Ray, Garrison, N. D.
54 Urinary Symptoms in Appendicitis. P. D. Peabody, Webster, S. D.
55 Neosalvarsan in Pernicious Anemia. M. C. Piper, Sanborn.
56 Twilight Sleep. C. J. Lavery, Aberdeen, S. D.
57 Divulsion of Pylorus for Spastic Contractions and Constrictions Due to Pathologic Changes Causing Partial Stenosis. J. E. Engstad, Minneapolis.

*October 1, No. 19, pp. 525-554*

58 Relation of Ocular Disease to General Medicine. C. E. Spicer, Valley City, N. D.
59 *Four Cases of Congenital Fracture of Clavicle. S. M. Johns, Velva, N. D.
60 Pathologic Laboratories of Great Britain. H. E. Robertson, Minneapolis.
61 Esophagoscope in Diagnosis of Diseases of Gullet. W. Lerche, St. Paul.
62 Infant Mortality in Minnesota. C. Easton, White Bear.

59. **Congenital Fracture of Clavicle.**—Johns' patients were brothers, aged, respectively, 24, 17, 14 and 12 years. The parents are living and in good health. There is another brother, 22 years of age, and one sister, 15 years of age, each in good health. No children of these parents are dead. The parents are farmers. These sons were reared on a farm, and now reside with their parents. One aunt, 35 years of age, is rachitic, the disease being of congenital origin and in a most severe form. With this exception, no other rachitic tendency is known among the relatives. There was an absence of a traumatic history in all four cases. None of the brothers had any knowledge of the existence of fractures. They had not experienced any inconvenience or pain from them, except the oldest brother, who suffered slight pain in his shoulder, when performing labor which exerted the shoulder muscles. Each of these cases show dystrophic conformation of other bones, more commonly of the cranium and thorax. In each the frontal bones are prominent. In one there is a flattened occiput. The ribs in two are of irregular curve, producing the barrel-shaped chest. The sternum in one shows imperfect development. There was irregular dentition in one, lordosis in one, and talipes varus in another.

## Lancet-Clinic, Cincinnati

*September 25, CXIV, No. 13, pp. 261-288*

63 Tuberculosis Problem. S. H. von Ruck, Asheville, N. C.
64 Medical Referee. D. W. Layman, Indianapolis.
65 Dental Department of Cincinnati General Hospital. H. MacMillan, Cincinnati.
66 Morphin Habit; Report of Cure. A. E. Osmond, Cincinnati.
67 Practical Importance of Anamnesis in Diagnosis in Psychiatry. C. E. Kiely, Cincinnati.

## Laryngoscope, St. Louis

*September, XXV, No. 9, pp. 603-674*

68 Experimental Studies of Effect of Various Atmospheric Conditions on Upper Respiratory Tract. G. H. Cocks, New York.
69 Papilloma oi Larynx. T. Hubbard, Toledo.
70 Texas Screw-Worm Infection of Entire Nose and Throat Including Accessory Sinuses. S. Israel, Houston, Tex.
71 Theory of Tonsillectomy, Results in Pediatrics. S. Blum, San Francisco.
72 Examination of One Hundred and Six Cases of Nasal Accessory Sinusitis, Showing Value of Routine Examination and Certain Intranasal Operative Procedures. J. J. Sullivan, Scranton, Pa.
73 New Support for Suspension Laryngoscope. S. Iglauer, Cincinnati.
74 New Bivalve Laryngeal Speculum. H. L. Lynah, New York.

## Medical Record, New York

*October 9, LXXXVIII, No. 15, pp. 593-638*

75 Cardiovascular Renal Disease (Arteriosclerosis). L. F. Bishop, New York.
76 Simplified Treatment of Anorectal Affections; Rectal Constipation; Resumé of Intestinal Stasis. S. G. Gant, New York.
77 Diagnostic Value of Bence-Jones Albumin in Early Stages of Case of Multiple Myeloma. G. H. Sexsmith and E. Klein, Bayonne, N. J.
78 Exudates in Artificial Pneumothorax. L. S. Peters, Albuquerque, N. M.
79 Relation of Nasal Symptoms to Endamebic Infections of Nose and Mouth. A. C. Howe, Brooklyn.
80 Use of Pituitary Extract. S. W. Bandler, New York.
81 An Unusual Case of Masturbation. J. A. Gilbert, Portland, Ore.
82 Effect of Intravenous Injections of Radium on Persistent Positive Wassermann Reaction. W. Ayres, New York.
83 Simple Practical Needle for Intravenous Injections. H. R. A. Graeser, New York.

## Michigan State Medical Society Journal, Grand Rapids

*September, XIV, No. 9, pp. 453-500*

84 Observations of Three Thousand Five Hundred Ninety Obstetric Cases. G. G. Barnett, Ishpeming.
85 Syphilis of Liver, Imitating Cirrhosis. A. I. Lawbaugh, Calumet.
86 Bronchoscopy and Esophagoscopy. H. M. Cunningham, Marquette.
87 Case of Mesenteric Chylous Cyst. R. C. Winslow, Sault Ste. Marie.
88 Three Cases of Dislocation of Semilunar. A. S. Kitchen, Escanaba.
89 General Paresis of Insane. F. C. Bandy, Newberry.
90 Usefulness of State Hospital. E. H. Campbell, Newberry.
91 Clinical Thermometer in Bladder. R. H. Crissey, Lansing.
92 Diagnosis and Treatment of Peptic Ulcer. H. B. Schmidt, Ann Arbor.
93 Case of Squamous Celled Carcinoma of Skin Following Empyema. W. A. Hoyt, Ann Arbor.
94 Three Human Hearts Showing Double Superior Venae Cavae. R. E. McCotter, Ann Arbor.
95 Case of Restoration of Upper and Lower Lids of Both Eyes. R. W. Selby, Ann Arbor.

## Military Surgeon, Chicago

*September, XXXVII, No. 3, pp. 207-310*

96 March and Rail Trip by Sanitary Troops. W. W. Reno, U. S. Army.
97 Duties of Ambulance Companies. L. L. Hopwood, U. S. Army.
98 Field Hospital Tour of Duty, Sparta, Wis. F. W. Foxworthy, Ind. N. G.

## Modern Hospital, St. Louis

*September, V, No. 3, pp. 145-220*

99 Geisinger Memorial Hospital, Danville, Pa. H. L. Foss, Rochester, Minn.
100 Occupation of Patients in State Hospitals for Insane. H. P. Frost, Dorchester Center, Mass.
101 Physician's Part in Making Small Hospital Successful. C. H. Cook, Natick, Mass.
102 Haverford College Infirmary and Dispensary. Baily and Bassett, Philadelphia.
103 Nervous and Mental Diseases in Curriculum. F. P. Norbury, Jacksonville, Ill.
104 Old Building Reconstructed into Excellent Children's Hospital. A. L. Goodman, New York.
105 Foods That Are Marketed in Small Packages. J. P. Street, New Haven, Conn.
106 Painless Childbirth and Hospital. C. H. Davis, Chicago.
107 Medicine and World War. G. D. Stewart and J. W. Draper, New York.
108 Operating Room. H. O. Collins, Minneapolis.
109 Efficiency and Progress in Hospitals. H. Wright, Cleveland.
110 Significance of Hospital Rating. F. E. Chapman, St. Louis.
111 Interdependence between Hospital and Outside Work. R. M. Bradley, Boston.

## New York Medical Journal

*October 9, CII, No. 15, pp. 737-784*

112 *Gonorrhea Complement Fixation Test. A. A. Uhle and W. H. Mackinney, Philadelphia.
113 Autolysin Treatment for Cancer. C. Pope, Louisville.
114 Inoperable Cancer Treated with Autolysin; Report of Cases. E. H. Williams, Los Angeles.
115 Id. H. G. Nicholson, Charleston, W. Va.
116 Autolysin Treatment of Inoperable Malignant Neoplasm. A. Wilson, Wheeling, W. Va.
117 Treatment of Fractures of Upper End of Humerus. R. E. Davison, Pittsburgh.
118 Broader View of Mental Deficiency in Aliens. H. A. Knox, Ellis Island.
119 Wright Reduction. R. H. Rose, New York.
120 Abuse of Insanity Plea as Defense for Crime. M. A. Hays, New York.
121 Backache. S. Epstein, New York.

112. **Gonorrhea Complement Fixation Test.**—This paper is based on a study of 155 gonorrhea complement fixation tests, in which the serums of 141 individuals were tested by each of four competent serologists. The blood was withdrawn with a dry sterile needle from a vein in the forearm, collected in four sterile test tubes of 5 c.c. capacity each, and one tube was sent to each serologist. When more than one specimen of blood from the same individual, withdrawn at the same time, was submitted, different names were used. Of the 141 patients, fifteen were normal controls who never had gonorrhea; thirty-seven suffered from other diseases, and all denied ever having had gonorrhea, and presented no clinical evidences of infection; the remaining eighty-eight have or have had gonorrhea. Of the fifteen series of tests on normal people in the present group, reported by each of the four serologists, only one laboratory, B, reported negative in each case. The percentage of positive reports by the other three serologists varied from 0.6 to 13.3 per cent. In the next group of thirty-seven patients, none of whom presented clinical evidences of gonorrhea, laboratory B again reported negative in each case, while the other three laboratories vary in their proportion of positive findings from 13.5

to 35.1 per cent. Of these thirty-seven patients positive reports were submitted by one or more of the laboratories in twenty-one cases; two laboratories reported positive reactions in eight cases and one laboratory in the remaining thirteen.

Of the eighteen patients clinically cured for over five years, all laboratories agree in a negative report in eight; one laboratory reports a positive in four cases; two laboratories a positive in five cases, and three laboratories a positive in one case. Of eleven patients with acute gonorrhea of less than four months' duration, all the laboratories agree in a negative report in three cases. Six patients had uncomplicated chronic urethritis; twelve had chronic urethritis with a history of previous epididymitis, and twelve chronic gonorrheal prostatitis. A positive report was received: In ten cases from one laboratory, in seven cases from two laboratories, and in two cases from three laboratories. In the remaining eleven, all reports show negative findings. Of the patients with acute gonorrhea with complications, three had epididymitis, three arthritis, and one iritis. In two cases, both of epididymitis, uniform negative reports were submitted. In two cases there were one positive and three negative reports; in two other cases there were three positive and one negative report, and in one case four positive reports. Of the 141 cases, excluding all anticomplementary reactions, there were 128 tests reported by each serologist; fifty-one or 39.9 per cent. agree, and seventy-seven or 60.1 per cent. disagree.

### Ophthalmic Record, Chicago

*October, XXIV, No. 10, pp. 493-546*

122 Pemphigus of Conjunctiva; Report of Two Cases. E. Stieren, Pittsburgh.
123 Late Infection Following Corneascleral Trephining. J. F. Crouch and C. A. Clapp, Baltimore.
124 Treatment of Trachoma. F. Allport, Chicago.
125 Spontaneous Reattachment of Retina after Twenty-Two Years' Duration; Report of Case. A. E. Davis, New York.
126 Eye Protection for Grinders and Machinists. H. W. Davie.
127 Some Unusual Features in Case of Senile Cataract Extraction. G. H. Burnham, Toronto, Canada.
128 Case of Epibulbar Sarcoma. H. F. Hansell, Philadelphia.

### Pennsylvania Medical Journal, Athens

*September, XVIII, No. 12, pp. 913-978*

129 Myocardial Insufficiency. U. G. Gifford, Avondale.
130 Infections of Hand and Their Management. S. J. Waterworth, Clearfield.
131 Medical Man's Work in Field of Safety. C. A. Haines, Sayre.
132 Gallstones; Report of Case. A. L. Parks, Rome.
133 *Case of Spina Bifida. O. H. Rockwell, Monroeton.
134 Functions of Health Bureau. C. P. Henry, Reading.
135 Ocular Symptoms of Parasyphilitic Affections, Paresis and Tabes. C. W. LeFever, Philadelphia.
136 Relief of Indigestion by Surgical Treatment. S. McClary, Philadelphia.
137 Case of Continued Fever of Undetermined Nature. B. F. Stahl and N. B. Gwyn, Philadelphia.

**133. Case of Spina Bifida.**—After a somewhat prolonged and difficult labor Rockwell's patient gave birth to a female child deformed as follows: The child's body was normal above the pelvis; the pelvis, however, was double, with three legs, the middle and smallest leg being somewhat deformed. There was a single opening behind, anal, in the right pelvis; there were two openings in front, one in each pelvis, the one in the right pelvis being a vaginal opening, with urethra communicating with the bladder, which was single; the other opening in the left pelvis, at first taken for the second vaginal opening, proved to be a second anal opening, although without sphincter muscle. There were fecal discharges from both openings, not always simultaneous, but continuing during her life. Between the middle and left leg at lower end of sacrum was a large fluctuating tumor, spina bifida, covered with integument, tense and almost transparent. The child lived and grew, though never strong, and never walking, but mentally a bright and attractive child, until nearly 10 years old when after a few days of extreme suffering due to pressure, the tumor ruptured, discharging large quantities of bloody serum; death followed in about seventy-two hours after the rupture.

## FOREIGN

Titles marked with an asterisk (*) are abstracted below. Single case reports and trials of new drugs are usually omitted.

### British Medical Journal, London

*September 18, II, No. 2855, pp. 425-460*

1 *Treatment of Cholera by Hypertonic Saline Solutions. G. D. Whyte.
2 Administrative Control of Measles. R. M. F. Picken.
3 Universal Suspension Apparatus for Arm and Leg. M. Sinclair.
4 *Obliteration of Cavity in Tibia Remaining after Sequestrotomy. W. Gemmill.
5 Treatment of Septic Wounds by Electrolytic Bath. F. Fowler.
6 Case of Hysterical Amblyopia. K. Campbell.

**1. Cholera Treated by Hypertonic Saline Solution.**—In the course of the Swatow epidemic reported on by Whyte, 212 patients were treated with intravenous saline injections; 154 recovered, that is, 72 per cent. It was on these lines that the Swatow epidemic was treated and the results varied according to the age, sex and habits of the patients. The main causes of the fifty-eight deaths were collapse, hyperpyrexia, uremia and asthenia. Collapse accounted for death in 6 per cent. of the patients treated. Hyperpyrexia accounted for death in 11.5 per cent. of the patients treated. Seven patients died from uremia; that is, 3 per cent. of those treated.

**4. Obliteration of Cavity in Tibia.**—The operation described by Gemmill is after the osteoplastic method recommended by Schulten.

### Journal of Pathology and Bacteriology, London

*July, XX, No. 1, pp. 1-84*

7 *Experimental Study of Metastasis. M. Takahashi.
8 Infective Abortion in Guinea-Pigs. J. H. Teacher and J. A. G. Burton.
9 *Occurrence of Pleomorphism and Mutation among Members of Hemorrhagic Septicemia Group of Organisms. J. P. McGowan and C. Y. Wang.
10 *Absorption of Iron from Organs after Hemolysis. R. Muir and J. S. Dunn.
11 Grouse Disease. J. P. McGowan.
12 *Pathology of Obstructive Edema of Lung, Based on Observations with Starling Heart-Lung Preparation. Y. Matsuoka.
13 Sarcoma Immunity in Mice. M. Tsurumi.

**7. Experimental Study of Metastasis.**—The studies with which Takahashi's paper deals were carried out by intravenous injection of tumor emulsions into the tail vein of mice. Fourteen different tumor strains were used; three sarcomas and eleven carcinomas. Of the three sarcoma strains studied, one failed to grow in the single short series inoculated, and the other two gave 33 and 88 per cent. of success, respectively. The eleven carcinoma strains varied between 0 per cent. and 78 per cent. success. The more differentiated carcinomas, papilliferous cystic adenocarcinomas and squamous-cell carcinoma, however, all failed to grow in the lungs. Seven alveolar carcinomas were not uniformly successful, five strains giving from 16 to 78 per cent., two strains 5 per cent. and 0 per cent., respectively. The solid alveolar tumors, therefore, appear to be more capable of intravascular growth than the more differentiated adenocarcinomas and the cancroid. As a general result it is concluded by Takahashi that the tumors of rapid growth grow better and in a higher percentage in the lung capillaries than the strains which grow slowly. Among the tumor strains used for these experiments some had produced metastasis after subcutaneous inoculation, while others had produced none through many (fifty to sixty) generations. On the other hand, the strains which did not metastasize to the lungs naturally, failed to grow on intravenous inoculation with a single exception. The percentage of successful intravenous inoculations is, however, not high in this strain. The conclusion seems justified that the absence of metastases after subcutaneous inoculation of many mouse tumors, is due to the inability of the tumor cells to survive after arrest in the lung capillaries and to establish organic union with the vessel wall.

**9. Hemorrhagic Septicemia Group of Organisms.**—McGowan and Wang show how an organism of the hemorrhagic septicemia group, by an increase of virulence through pas-

sage, has also concurrently been endowed with an increased biologic activity on artificial mediums, whereby it grows much faster on these mediums and produces acid and gas fermentation in some carbohydrate mediums in cases in which it only produced acid or no change previously. It would seem to be essential for the success of this passage that the organism be taken directly from one animal to another without intervening growth on artificial mediums. Retrogression of these newly acquired biologic activities would appear to be slow. The serum obtained by immunizing rabbits with the original and virulent strains, respectively, while agglutinating their own strains well, do not, or only slightly, cross-agglutinate. The immunity to a subsequent injection, both of the virulent and of the original strain appeared to be much greater after the preparatory injection of the virulent strain than after a similar injection of the original strain.

10. **Absorption of Iron After Hemolysis.**—Muir and Dunn found that after acute hemolytic anemia in rabbits the excess of iron which has been stored in the organs, has been nearly all absorbed by the time of complete regeneration of the blood, and has been presumably utilized for purposes of blood formation. The absorption is most complete from the liver cells; it is less complete, a certain excess still remaining, in the endothelium of the liver capillaries, in the pulp of the spleen and especially in the cortex of the kidneys.

12. **Experimental Edema of Lungs.**—Matsuoka carried out a systematic study of the experimental production of obstructive edema of the lungs in isolated heart and lungs of dogs. His investigations were made with the aid of the Starling heart-lung preparation in which the part played by the heart in the production of obstructive edema of the lungs can be well studied. He also investigated the influence of the extirpation of the pericardium and of changes in the temperature of the blood on the production of obstructive edema, and studied the gaseous metabolism and energy of the heart in this condition. Obstructive edema of the lungs takes place when certain limits of combined arterial pressure and venous inflow are exceeded. (*a*) Obstructive edema is produced with a constant moderate arterial pressure of 80 mm. of mercury, when a total output of heart of not less than 92 liters per hour is maintained for over fifteen minutes. Obstructive edema of the lung is produced with a constant high arterial pressure of 160 mm. of mercury when a total heart output of not less than 38 liters per hour is maintained for over fifteen minutes. In cases of arterial pressure between 80 and 160 mm. of mercury, the limits of the output of the heart may be taken as lying about the average of the two extreme cases. All the above-mentioned maximum and minimum volumes refer to dogs' hearts which have an average weight of 42 gm.

The above mentioned limits may be raised still higher in cases in which a high arterial pressure of abundant venous inflow continues for a shorter period than fifteen minutes. How far the foregoing lower limits must be exceeded so as to produce obstructive edema in dogs with hearts of a specified size depends on the age of the dogs, on various bodily conditions, on the circumstances of operation, and on the duration of the experiment. The production of obstructive edema is considerably facilitated by the occlusion of the root of the aorta, when a relatively small amount of venous inflow is sufficient to produce the lung condition. In the production of obstructive edema, the output of the heart may be diminished to a minimum, and the blood content of the heart and the pressures in the pulmonary artery, the inferior vena cava, and the right auricle may be increased to a maximum, all quite independently of the height of the arterial pressure and of the amount of venous inflow. As the dilatation of the heart after extirpation of the pericardium easily assumes a pathologic degree, edema of the lung usually occurs more quickly and with a smaller amount of arterial pressure and of venous inflow than when the pericardium has not been removed. Gaseous metabolism and energy consumption of the heart are decreased in obstructive edema of the lung. In all cases in which the experiments with the Starling heart-lung preparation were carried out to a conclusion, the following pathologic conditions were seen in the lung; increase in volume following on diffuse congestive edema unrecognizable macroscopically, atelectasis and compensatory emphysema, and splenization of the lower lobes.

## Lancet, London

*September 18, II, No. 4803, pp. 635-684*

14 Combining Medical with Military and Military with Medical Education and Mingling Music with Both. H. Morris.
15 *Bacteriology of Septic Wounds. A. Fleming.
16 Rhinophyma; Its Etiology, Pathology and Treatment. W. Milligan.
17 Galyl, Substitute for Salvarsan and Neosalvarsan. A. Foerster.
18 Case of Temporary Motor Aphasia Developing in Course of Tuberculosis. J. B. McDougall.
19 Salvarsan in Treatment of Yaws. W. M. McDonald.
20 One Hundred Consecutive Operations for Appendicitis. R. M. Glover.
21 Rupture of Ventral Hernia in Adult Woman with Extroversion of Bladder. H. B. Tawse.
22 Case of Supernumerary Toes. C. G. Havell.
23 Gallstone Complicating Appendicitis. F. Deane.

15. **Bacteriology of Septic Wounds.**—The organisms which Fleming has found in these wounds divide themselves into three groups: (1) spore-bearing microbes of fecal origin; (2) nonsporing microbes of fecal origin; and (3) pyogenic cocci. The first group includes *B. tetani*, *B. acrogenes capsulatus* of Welch, and certain putrefactive organisms which Fleming refers to as bacillus X and bacillus Y. The habitat of all these is the intestine of man and animals, or in soil which has been manured with animal excrement. The non-spore-bearing organisms of fecal origin include the streptococcus, *B. proteus*, *B. coli* group, and "wisp" bacillus. The streptococcus is the most important member of this group as regards infection of wounds. It is present in almost every wound up to a late stage. From its appearance in the wound early, and in association with organisms which are of known fecal origin, Fleming assumes that the streptococcal infection is also a fecal one. The third group of pyogenic organisms comprises especially the streptococcus and staphylococcus. *Staphylococcus aureus* is almost the only organism frequently occurring in wounds which is not common in animal feces. It is noteworthy that *Staphylococcus aureus* is seen in wounds only in the later stages, and as they are present on the patient's skin, it seems likely that their appearance in the wound is largely due to an invasion from the skin around.

The bacillus X is a straight bacillus 5 microns long and 1 to 1½ microns broad, nonmotile, gram-positive, and sporing freely in all mediums. In agar or glucose agar stab cultures there is much gas production. Coagulated egg medium is liquefied. Milk is not clotted, but in three or four days it is peptonized. One cubic centimeter of a vigorous milk culture injected subcutaneously into a guinea-pig produced much local edema which persisted for three days and then disappeared. The same quantity of a broth culture had no effect. Bacillus Y is a long, slender, gram-negative bacillus, feebly motile, which shows close to or at one extremity an elongated spore. It was not so commonly found as bacillus X. It forms less gas in agar or glucose agar, and the liquefaction of albuminous material such as egg proceeds more slowly. The smell of all cultures is excessively putrid. This bacillus was not pathogenic for guinea-pigs. The "wisp" bacillus is a small, slender, gram-positive nonmotile bacillus, which is of common occurrence in wounds, especially in the later stages. It arranges itself into V shapes or is aggregated into small bundles, something after the fashion of the diphtheroid group. It is an obligate anaerobe. In pus this organism is usually to be seen inside the leukocytes, and it would appear to possess a pyogenic character, as it is usually to be seen in large numbers in wounds which are producing large quantities of pus, but which differ in no other respect from similar wounds from which the purulent exudate is much less.

## Annales de Gynécologie et d'Obstétrique, Paris

*July-August, XLI, Nos. 7-8, pp. 545-608*

24 *Ventrofixation of the Uterus. (Suites physiologiques et pathologiques de l'hystéropexie abdominale directe.) M. Muret.

25 Microscopic Study of Sclerocystic Ovaries, and Operative Conclusions. (La résection partielle des ovaires reconnus macroscopiquement scléreux ou sclero-kystiques, est-elle justifiée au point de vue microscopique?) J. P. de Figueiredo. To be continued.

26 Questions of Priority in the History of Medicine. (La réaction contre la culture allemande en Italie.) L. R. Sanguineti.

24. **Ventrofixation of the Uterus.**—Muret insists that ventrofixation of the uterus is not enough to ensure the complete cure of prolapse of genital organs unless the perineum and pelvic floor are made a good support besides. In two cases he found that the intestines had been gradually forced down into the pouch of Douglas, forming an actual posterior vaginal enterocele. The uterus in both had been fastened to the abdominal wall, but the pelvic floor had not been strengthened. He has found in the literature sixteen cases of ileus following ventrofixation by various technics. Such mishaps are avoided by fastening a large area of the uterus fundus high up on the abdominal wall, when the patient is elderly. With young women he leaves the fundus untouched, and fastens the lower part low down on the abdominal wall, suturing merely a narrow and superficial strip of the uterus wall. This results in the formation of a median ligament uniting the anterior wall of the uterus, just below the starting point of the round ligaments, to the abdominal wall above the pubic symphysis. If the ligament lengthens, the uterus returns to its normal position; if the ligament keeps short, the uterus is held a little higher than usual but there is no interference with pregnancy later. In 250 ventrofixations which he has done he has never known of complications on the part of the intestine later.

## Bulletin de l'Académie de Médecine, Paris

*September 7, LXXIV, No. 36, pp. 243-274*

27 Localization of Projectiles. O. Laurent.

28 *Therapeutic Enhancing of Phagocytosis. (Action cytophylactique du chlorure de magnésium.) P. Delbet and Karajanopoulo.

29 *Importance of Epinephrin in Treatment of Wounded Soldiers. (Importance de la notion d'insuffisance surrénale et du rôle de l'opothérapie surrénale en médecine et en chirurgie d'armée) E. Sergent.

30 *Inflammability of Gas in Gas Gangrene. (2 cas de gangrène gazeuse du cou. Procédé de diagnostic différentiel avec l'emphysème souscutané.) Guéniot.

28. **Therapeutic Enhancing of Phagocytosis** — Delbet's experiments on dogs and in vitro have been confirmed by a few clinical experiences, all demonstrating, he declares, the remarkable "cytophylactic power" of a 12.1:1,000 solution of anhydrous magnesium chlorid. Before an intravenous injection into a dog of 150 c.c. of this solution, 245 microbes were found incorporated in 500 polynuclear leukocytes. After this injection, 681 were found incorporated among 500 polynuclears. In other tests the numbers phagocyted were respectively 71 and 308; 387 and 872. The effect seems more pronounced the more nearly normal the leukocytes. The solution does not seem to be toxic; no untoward by-effects were noticed in animals after injections into the cellular tissue, peritoneum or veins. In man he has never injected it into a vein, but has found it useful for dressing wounds and in subcutaneous injections. In one case of a suppurating wound after crushing of the knee, he was contemplating amputation but the phagocytosis under the magnesium chlorid improved conditions so that the limb was saved.

29. **Epinephrin for the Wounded.**—Sergent has been preaching since 1898 the importance of a deficit in suprarenal functioning as a factor in various syndromes. His experience at a base hospital has confirmed the frequency of acute disturbance in one or both suprarenals from toxic-infectious influences or hemorrhage. Also of sudden aggravation of a previously latent debility of the suprarenals. Under ordinary conditions they are able to accomplish their task, but under sudden stress they break down. Both conditions are encountered almost daily in wounded and sick soldiers from the front. Collapse was particularly frequent in typhoid among soldiers who had been under special physical stress. In many of these cases large subcutaneous doses of suprarenal extract tided the men past this dangerous phase. Similar experiences have been noted in typhus, according to the account of a French medical officer returned from captivity in Germany. In several cases Sergent witnessed the subsidence of the algid phase in choleriform diarrhea under the influence of injections of suprarenal extract. Naamé of Tunis has reported success in cholera beyond all expectations, from the use of epinephrin as an adjuvant to serotherapy. Two of Sergent's patients had been brought in completely collapsed; the asthenia was absolute. One had long presented symptoms of abortive Addison's disease; the other had recurring attacks of asthenia following typhoid years before. Both presented the typical "suprarenal white line," hypotension, hypothermia and tendency to collapse, but both rallied promptly under suprarenal treatment.

The wounded are in such a state of shock, as a rule, that the extra shock of general anesthesia is liable to extinguish the flickering flame of life, unless the surgeon appreciates the important aid to be obtained from epinephrin. Sergent urges that the ambulances, the first aid stations and the trains carrying the wounded should be supplied with suprarenal extract to use in preventing or combating suprarenal insufficiency. Even if the patient's suprarenals are working properly, this treatment is a most excellent tonic for the cardiovascular system. In the collapse of typhoid he warns that the amount must be at least 2 mg. of the 1:1,000 solution, fractioned into four doses, and supplemented by 1 or 2 mg. given by the mouth. This combines rapid and intense absorption with slow and continuous absorption. He is convinced that many of his patients owe their lives to this technic.

30. **Inflammability of Gas in Gas Gangrene.**—Guéniot has found this a useful aid in differentiating gas gangrene from subcutaneous emphysema. On contact with the actual cautery there was a tiny spurt of flame; it was never enough to burn the tissues.

## Lyon Chirurgical, Lyons

*September, XII, No. 3, pp. 229-396*

31 *Abdominal Surgery in Field Ambulance. X. Delore, G. Cotte and A. Latarjet.

32 Apparatus for Immobilization and Extension, Permitting Changes of Dressings, for Compound Fracture of the Femur. G. Gayet and A. Théron.

33 Immediate Symptoms of Penetrating Wounds of the Chest. (Plaies pénétrantes de poitrine.) L. Desgouttes and E. Bressot.

34 *Importance of Lumbar Puncture in Cases of Nervous Shock and Wounds of the Skull in War. J. Baumel.

35 *Scalp Wounds and Contusion of the Brain. I, II, III. (Des petites plaies du crâne par éclats d'obus et de bombes sans pénétration du projectile, et des lésions nerveuses qui les accompagnent.) R. Leriche; (Des lesions cérébrales et médullaires produites par l'explosion à faible distance des obus de gros calibre.) R. Leriche.

36 Necessity for Double Trephining When Projectile Has Traversed the Skull. R. Leriche.

37 Trephining for Shell Wounds of the Skull. (Notes sur les suites opératoires de 33 trépanations pour plaies du crâne par éclat d'obus.) A. Gourliau.

31. **Abdominal Wounds in War.**—These three surgeons attached to field ambulances are all in favor of immediate operations for gunshot or shell wounds of the abdomen.

34. **Lumbar Puncture after Wounds of the Skull or Concussion.**—Baumel has found that lumbar puncture gave important information as to the extent and severity of the injury; it had also a marked beneficial influence as the spinal fluid was always under high pressure, even when there had been merely concussion without direct contact with the skull. The detailed findings in fifty-six cases are tabulated. The wound was the work of a fragment of shell in nearly all the cases. The polynuclears increase during an infectious process so that polynucleosis after injury of the skull renders the prognosis graver. In the cases with lymphocytosis alone, the meningitis, of which it is the index, can be only subacute. With simple commotion of the nervous system, lumbar puncture is the only rational treatment, as also with nonpenetrating wounds of the skull. It reduces also the disturbances from hypertension in cases of severe injury of the skull, while it gets rid of toxins and hastens the return of normal conditions. It should be done systematically, day after day, and seems to be absolutely harmless unless the pressure in the fluid is below normal to start with.

35. **Wounds of the Skull and Contusion of the Brain.**—Leriche devotes sixty-six pages to this study of wounds of the skull and the nerve lesions which accompany them. He has seen 397 cases in which the scrap of shell had apparently merely bruised the scalp. He always made an exploratory incision and trephined if the bone looked in any way abnormal, and seventy-eight in this group were traced to recovery or death. No matter how apparently insignificant the lesion, every wound of the scalp by a projectile should be incised and the bone examined, but the dura should never be incised if it is found intact, no matter how extensive the subjacent hematoma, contusion of the brain and immobility of the dura. High tension in the fluid at lumbar puncture is no criterion as to deep-seated lesions; high tension and an abnormal tint of the fluid reveal the existence of small foci of contusion of the brain which are not so much the work of the projectile as of the air concussion from the explosion of the shell. He found lumbar puncture a valuable aid in treatment. The details of eighty-seven cases are given, as also of eleven in which there was no direct wound but severe contusion of the brain or spinal cord from explosion of a shell or mine. The fluid keeps under high pressure for days and the patients exhibit paralytic phenomena or melancholia with stupor or jacksonian epilepsy. Edema of the brain and small hemorrhagic foci were found on trephining and lumbar puncture gave great relief as a rule.

## Berliner klinische Wochenschrift

*August 30, LII, No. 35, pp. 909-932*

38 Action of Atropin and Scopolamin on Cats' Eyes. G. Joachimoglu.
39 Diagnosis and Treatment of Wounds of the Lungs. (Lungenschüsse.) S. Korach.
40 Lumbar Puncture for Submeningeal Hemorrhage of Traumatic Origin. T. v. Podmaniczky.
41 Nontoxic Dysentery Bacilli. (Ruhrbacillen des giftarmen Typus.) G. Arnheim.
42 *Tetanus. B. O. Pribram. Commenced in No. 33.

*September 6, No. 36, pp. 933-960*

43 Picking up the Wounded on the Field. (Verbesserung der Verwundetenfürsorge in der Front.) Kobisch.
44 Influences of Diseases, Especially Tuberculosis, on Growth and State of Nourishment of Schoolchildren. (Einfluss von Krankheiten auf das Wachstum und den Ernahrungszustand der Schulkinder.) Thiele.

42. **Tetanus.**—Pribram regards the localization of the spasms as of great importance for the prognosis; it is naturally graver when the muscles of the diaphragm and glottis are involved, even when all the other muscles are spared. Pain in the epigastrium is an early sign of involvement of the diaphragm. He accepts the duration of the incubation as dating from the moment of toxin production, not from the moment of the injury. Three signs differentiate tetanus from tetany: the lack of the facialis phenomenon, of the contraction of the hand, and of the isolated adductor spasms. The frequency of pneumonia in tetanus suggests that it is a specific complication. He was impressed with the fact that in a remarkably large proportion of his tetanus patients, and in nearly all of those that succumbed, signs of the status lymphaticus were manifest.

The best treatment of the wound consists in radical excision of all necrotic tissue down into fresh bleeding tissue. Anything inducing a scab favors development of tetanus. In one case no portal of entry for the tetanus bacilli could be found except peeling between the toes from sweat. The usual measures have no effect on the diaphragm-glottis spasms. All we can do is to hold back normal breathing and supplement it at need with artificial respiration; we can realize this by severing the phrenic nerve on each side, with or without tracheotomy, by injecting magnesium sulphate with the shoulders lowered, or by gradually limiting the normal breathing by large doses of morphin. The morphin has to be given in increasing doses up to 0.3 gm. per day; ordinary doses have no effect. Symptomatic treatment aims to ward off spasms, and this is imperative with diaphragm-glottis spasms as any one is liable to prove fatal. When all is in readiness for artificial respiration, these large doses of morphin need cause no apprehension, he says.

## Deutsche medizinische Wochenschrift, Berlin

*September 9, XLI, No. 37, pp. 1085-1116*

45 *Care Early in Typhoid. (Bedeutung der ersten Krankheitstage für den Verlauf des Bauchtyphus.) A. v. Koranyi.
46 Septic Meningococcus Infection; Four Cases. A. Bittorf.
47 Comparison of Roentgen-Ray and Clinical Stomach Findings. W. Jaworski.
48 Magnesium Glycerophosphate Proves More Toxic than the Sulphate in Experimental Tests. (Ueber die subkutane Methode der Narkose durch Magnesiumsalze: Sulfat und Glycerophosphat.) R. Kobert.
49 Hypophysis Extract Checks Diuresis. (Ueber die Beeinflussung der Diurese durch Hypophysenextrakte.) A. v. Konschegg and E. Schuster.
50 Irregular Pulse from Military Standpoint. (Der unregelmässige Puls.) P. Reckzeh.
51 Kaolin Plus Opium, by Rectal Injection, Proves Effectual in Dysentery. (Behandlung von Ruhr und ruhrähnlichen Darmkatarrhen.) du Mont.
52 Air Concussion from Infantry Projectiles not Serious. (Luftdruck bei Infanteriegeschossen.) M. Reuter.

45. **Management of Typhoid in First Few Days.**—Koranyi has been studying the influence on the course of typhoid, in his 523 cases, of the care of the patients during the first few days. The mortality increased from 5.6 per cent. among those patients received at the hospital from the first to the fourth day of the disease, to 10.1 per cent. after the seventh day.

## Jahrbuch für Kinderheilkunde, Berlin

*September, LXXXII, No. 3, pp. 175-260*

53 *Albumin Milk. (2½ jährige Erfahrungen mit Eiweissmilch.) V. Poulsen.
54 *Congenital Ichthyosis. O. Bossert.
55 *Etiology of Scarlet Fever. F. Schleissner.
56 *Relations between Otitis Media and the Various Diseases of Infants. (Beziehung der Mittelohrentzündung zu den Krankheiten des Säuglingsalters.) F. Scherer and O. Kutvirt. Commenced in No. 2.

53. **Albumin Milk.**—Poulsen makes the albumin milk a little different from Finkelstein's formula, using 9 parts casein to 8 parts carbohydrate instead of Finkelstein's 2 to 1. It also contains a larger proportion of whey, namely, ⅓ liter whey plus the whey from ½ liter buttermilk, thus ensuring a larger amount of salts. One liter represents 560 calories instead of Finkelstein's 420. Poulsen has found this albumin milk most effectual in chronic diarrhea in infants over a year old, but he summarizes in detail his experiences with 124 infants fed on this albumin milk and their development followed during the months and years since. He emphasizes the importance of constant vigorous stirring while boiling up. He passes the freshly clotted casein from 1 liter of full milk through a hair sieve at least ten times, after mixing it into ½ liter water and ½ liter buttermilk. The cane sugar is then added, dissolved in as little water as possible, and the whole is boiled up and passed through a hair sieve until it is nearly cold. Then it is chilled further in water and the bottles are filled and placed on ice.

54. **Congenital Ichthyosis.** — Bossert says that only one original case of this affection has been published in German pediatric literature, and he gives here an illustrated description of a typical case encountered at Breslau. The skin was hard as leather and had cracked at numerous points. This horny shell over almost the entire body prevented suckling and the normal play of the vital processes, and the infant lived only four days. It was the first child of healthy and well-to-do parents, and seems to be about the sixtieth case on record.

55. **Etiology of Scarlet Fever.**—Schleissner succeeded in twelve of twenty-seven attempts in inducing in monkeys a disease apparently identical with scarlet fever. He insufflated into the mouth and nose twenty-four hour bouillon cultures of streptococci from scarlet fever cases. The disease could be also transferred to healthy animals by smearing with secretions from the throats of those affected. It proved impossible to reinfect those in the latter group, indicating that immunity had been realized. Likewise all attempts failed at inoculation with filtrates of the bouillon cultures.

56. **Otitis Media in Infants.**—Scherer and Kutvirt here conclude their study of the relations between otitis media and the various diseases of infancy. They found otitis media in 18.6 per cent. of the cases of nutritional disturbances, and in from 6.6 to 25 per cent. of the affections of the air passages, the proportion being larger the closer to the eustachian tube. The vomiting with digestive disturbances, the sneezing with rhinitis, and the coughing with bronchitis and pneumonia explain the frequent involvement of the middle ear. Fully 22.3 per cent. of the infants with inherited syphilis had otitis media, and 30.4 per cent. of the tuberculous infants. In these two groups the ear trouble developed insidiously. In every case of parotitis there was also otitis media. The latter seems to be only exceptionally a primary affection. Otitis media is always a grave affection for infants, depressing the vitality, and it may even prove fatal. But proper treatment, as for adults, applied early is generally followed by prompt recovery, although a tendency to recurrence may be apparent into late childhood.

They call special attention to their three cases of convulsions (eclampsia) in all of which there was a suppurative otitis media. Paracentesis was followed by prompt subsidence of the convulsions and striking improvement in the general condition. The circumstances in these cases render the assumption plausible that both the convulsions and the otitis media were manifestations of intestinal infection and intoxication.

**Medizinische Klinik, Berlin**

*August 29, XI, No. 35, pp. 959-986*

57 Modest but Certain Food Value of Blood from the Slaughter-Houses. (Blut als Nahrungsmittel.) F. Blum.
58 Reciprocal Relations between the Consciousness, and the Innervation of the Vascular System. (Die wechselseitigen Beziehungen zwischen den Vorgängen des Bewusstseins und der Innervation des Gefässsystems.) H. Bickel.
59 Disturbances Following Grenade Explosions. (Ueber Granatexplosionsstörungen.) L. Mann.
60 *Vaccination against Typhoid and Diagnosis of Typhoid in the Vaccinated. (Typhusschutzimpfung und Typhusdiagnose bei Geimpften.) C. E. C. Bronner.
61 The Exhibitionist. (Zur Kenntnis des Exhibitionismus.) G. Flatau.
62 Stereoscopic Localization of Projectile in Tissues. (Bestimmung der Geschosslage mittels der Stereoskopie.) Drüner.

*September 5, No. 36, pp. 987-1014*

63 Pneumonia. H. Hochhaus.
64 *Injurious Action on Central Nervous System of General Anesthesia and Means to Prevent It. E. Weber.
65 Photodynamic Action of Eosin Not Dangerous. (Zur Physiologie und Toxikologie des Eosins.) E. Rost.
66 *Importance of Fat Embolism in Military Surgery. L. Bürger.
67 Aleukemic Myelosis. F. Weinberg.
68 "Patella in the Elbow." (Ellbogenscheibe.) L. Katz.
69 *Mintz' Meat Extract Test Breakfast. (Das Mintzsche Bouillonprobefrühstuck.) E. Rosenhain.

60. **Typhoid in the Inoculated.**—Bronner has been studying in particular the agglutination titer after inoculation. He tested for it in 104 cases with intervals of from one to seven months since the inoculation. He was surprised to find that the eighty-fifth day seemed to be the dividing line. Up to that day all responded positively to the agglutination test, but after the eighty-fifth day 47.2 per cent. gave no agglutination response. The intervals between the inoculations did not seem to influence the agglutination titer. This test cannot be accepted as a criterion for the diagnosis of typhoid with a titer above 1:200, and only in about 89 per cent. of the cases can it be utilized for the diagnosis. An increasing titer, regardless of the actual figures, strongly suggests typhoid if a month at least has elapsed since the inoculation. The course of typhoid is modified by the inoculations, but it still retains its typical character. The blood picture and urine findings are apparently not influenced if the interval since the inoculation is longer than two weeks. It is a little more difficult to cultivate the bacilli from the blood, and serologic tests cannot be depended on in fully one fifth of all cases after three months.

64. **Means to Prevent Injurious Action of Anesthetics on the Central Nervous System.**—Weber has been making a special study for years of the central mechanism for the innervation of the blood vessels, and the war has afforded him unprecedented opportunities for this research. Some of his conclusions were summarized in these columns June 5, 1915, p. 1949, as he applied in treatment of concussion of the brain some of the facts learned in his experimental work. The vessels shrink, instead of the normal dilatation, during mild muscular effort when the central mechanism for the innervation of the vessels is deranged. The standard test is by dorsal and plantar flexion of the foot, hanging free; in health this gentle exercise induces dilatation of the vessels elsewhere in the body (except in the brain). After local anesthesia there are evidences of perverted vasomotor functioning, lasting for one or two days, and in about half the cases there is disturbance in the vascular reaction. With chloroform general anesthesia, the same occurs but much more pronounced, the disturbances lasting from five to six days and the morbid vascular reaction occurring in every case and being still manifest from one to six weeks afterward.

He theorizes to explain these phenomena, commenting on the extreme sensitiveness of the central vasomotor mechanism to injurious influences brought by the blood. He also comments on the prompt way in which this mechanism seems to be steadied and brought back to normal under the influence of stimulation from alternating hot and cold douches. This report is based on fifty cases studied from this point of view and known to have had normal conditions before the anesthetic was applied. Tracings from two cases are given; in one the tests showed abnormal conditions persisting four weeks after the chloroform. The alternating hot and cold douches were then applied (as described in the abstract referred to above), and by the fourth douche all the symptoms had disappeared, including the muscular weakness, exhaustion on climbing stairs, profuse sweating on slight exertion, and headache—all part of the syndrome resulting from derangement of the central mechanism for innervation of the vessels. Ether seemed to exert an injurious influence to a degree about midway between that of local anesthesia and chloroform.

66. **Fat Embolism in Military Surgery.**—Bürger remarks that the clinical diagnosis of fat embolism in the lungs or in the organs of the greater circulation was never made during life in the cases in his experience. But the clinical picture as he describes it seems to be characteristic. Prophylaxis is extremely important in managing the wounded in war. The Esmarch bandage should be applied the same as for hemorrhage to ward off fat embolism in all cases of multiple fractures or single fracture in the severely wounded, especially the elderly and those weakened by disease or alcohol, those that have been run over by a vehicle or thrown from a horse or hurled by an explosion. Immediate application of the Esmarch bandage will not only prevent further destruction of fat tissue by the blood, but will prevent that already broken up from being transported elsewhere. Even Momburg constriction at the waist line might be advisable, especially with crushing injury of the pelvis. Judging from his experimental research, already disintegrated fat may become bound by coagulating blood, and thus the danger of embolism be averted. The Momburg constricting band should not be left on too long; half an hour should be sufficient. Before removing the Esmarch bandage, venesection might drain away any loose fat particles in the blood, but Bürger thinks that this is scarcely necessary. Injection of gelatin into the limb might favor development of thrombosis.

It is extremely important, he reiterates, to leave the severely wounded where they are; any attempt to move them to a distance is liable to bring on fatal fat embolism. It may be necessary to make ample provision for draining the crushed soft tissues. When a crushed limb has to be amputated, the danger of fat embolism must be heeded more than has been the case hitherto, and, for the same reason, delirium should not be allowed to develop or should be checked.

The toxic action of chloroform is magnified when there is fat embolism. Most physicians regard fat embolism as beyond all aid, but Bürger thinks that much can be accomplished by prompt diagnosis and opening up of the focus in the bone and tamponing it. Venesection also relieves the heart combating against the fat embolism in the greater cir-

culation, kidneys, etc. Saline infusion seems contraindicated, in his opinion, although Gaugele advocates it. Stimulation of the heart he regards as useful.

In his experience, the onward passage of the fat emboli seemed to be independent of the heart force, and to depend rather on the nature of the fat and the construction of the lung capillaries. Diversion of fluids to the intestines, as with calomel, is liable to prove useful. If symptoms of pressure on the brain develop from venous stasis or hydrocephalus, leeches to the mastoid process might divert the fluid effectually, as also revulsion in the scalp by hyperemia induced by an irritating salve. Lumbar puncture may also aid in diagnosis and as a therapeutic measure, but it must be applied with extreme caution. After recovery from fat embolism, we must expect considerable damage from the passage of the fat emboli, and time must be given for repair, longer than would be necessary with the same wounds, fractures and contusions without the embolism. We may expect to have the patient complain long of general weakness, dizziness, ready fatigue, heart disturbances, dyspnea, or depression. Lumbar puncture may relieve or cure some of these persisting symptoms, supplemented by hot foot baths, air and sun baths and revulsive measures in general, warning impressively against overexertion either mental or physical. If possible the patient should be given light work and gradually resume his ordinary occupation.

69. **The Meat Extract Test Breakfast.**—Rosenhain has been giving Mintz' test breakfast a thorough trial. (It was described recently in THE JOURNAL, Sept. 18, 1915, p. 1067.) He tabulates the findings in twenty cases with parallel test breakfasts. They testify that the Mintz technic is reliable and highly instructive, but that it belongs to hospitals and laboratories rather than to general practice. The Ewald test breakfast answers practical purposes better and gives all the information needed as a rule in general practice.

### Münchener medizinische Wochenschrift, Munich

*September 7, LXII, No. 36, pp. 1209-1240*

70 Treatment of Diphtheria. O. Seidel.
71 Coagulation Reaction in Diagnosis of Syphilis. (Serodiagnostik der Syphilis mit chemischen Substanzen.) v. Dungern.
72 Agglutination of More than One Species of Bacteria. (Die Bildung von Nebenagglutininen.) F. Kutscher.
73 *Ingestion of Salt Checks Night Sweats and Sweating in General. (Einnahme von NaCl ein Mittel zur Verminderung der Schweissbildung bei Phthisikern und auf Märschen und zur Verhütung von Magenstörungen bei Anstrengungen und Hitze.) R. Link.
74 Emergency Obstetric Application of the Hydrostatic Bag. (Zur Technik der Hysteroryse.) K. Tietze.
75 Improved Technic for Politzerization. (Zur Technik der Politzerverfahrens.) K. Bottger.
76 Blinded Soldiers as Masseurs. R. Kuh.
77 War Injuries of the Central Nervous System and Welfare Work. (Kriegsbeschädigungen des Zentralnervensystems und soziale Fürsorge.) Rittershaus.
78 Localization of Foreign Bodies. (Zur röntgenologischen Fremdkörperlokalisation.) M. Favarger.
79 Constricting Band Renders Exanthem Manifest in Typhus. (Die künstliche Stauung als diagnostisches und differentialdiagnostisches Hilfsmittel beim Fleckfieber.) C. Dietsch.
80 Improved Technic for Splints. (Die Leerschiene.) v. Gruber.
81 Improvised Electrotherapeutic Appliances. Wunder.
82 Toxic Action of Sulphur Soap. (Intoxikationen nach prophylaktischer Schwefelanwendung und ihre Verhütung.) E. Hesse.
83 *Ring of Roofing Paper to Protect Superficial Lesions. (Dachpappe zur Fensterung von Verbänden.) Krug.
84 Wounds of Peripheral Nerves. (Ein offenes Wort an die Kollegen.) W. Fürnrohr.

73. **Ingestion of Salt Checks Sweating.** — Link gave a number of consumptives in his care a level teaspoonful of salt in half a glass of water, that is, about 5 gm. sodium chlorid in 150 c.c. water, on the assumption that the loss of salt in the night sweats might be responsible for the depression felt after them. To his surprise he found that the patients did not sweat as freely as under other conditions. The salt evidently checked the production of the night sweats. Since then he has given salt systematically in this way to over a hundred tuberculous patients and the effect was almost invariably good. The salt even checked sweating under sodium salicylate and during the crisis in pneumonia. The possible causes for this action of salt are discussed at length and he reports further the apparently favorable influence of ingestion of a hypertonic solution of salt preliminary to long marches to prevent excessive sweating.

83. **Ring to Protect Open Wounds.**—A broad strip of roofing paper is slit at intervals along one edge, and the strip is then rolled into a ring to fit over the lesion. The slit edge adapts itself to the surface of the skin below. A sheet of gauze is laid over the top of the ring, held in place by a second narrower ring slipped on outside. The tar paper does not absorb secretions.

### Therapie der Gegenwart, Berlin

*September, LVI, No. 9, pp. 321-360*

85 Substitutes for Amputated Limbs. (Ueber den Ersatz amputierter Glieder.) M. Cohn.
86 *Organotherapy in War Medicine; Conception of Dyshormonism. (Anti-Thyreoidin und Hypophysin in der Kriegs-Medizin.) O. Kohnstamm.
87 Vaccineurin in Treatment of Neuritis. K. Löwenstein.
88 *Nonsurgical Treatment of Anal Fissures. F. Schilling.

86. **Dyshormonism.**—Kohnstamm relates a number of instances in which thyroid or hypophysis extract or epinephrin caused a surprising change for the better in various morbid conditions from disturbance in internal secretions, superposed on or caused by the emotional stress of the campaign or resulting from concussion of the nervous system. He regards neurasthenia in soldiers as having a somatic basis in molecular disturbances or changes in the nerve tissue like those which distinguish magnetic from nonmagnetic iron. In several cases some of the symptoms of exophthalmic goiter had developed in soldiers and officers on active service, but it subsided under antithyroid treatment. A typical asthma or bronchitis was materially benefited in many instances by a combination of hypophysis and suprarenal extracts. In one case of exophthalmic goiter in a soldier, tachycardia changed to bradycardia as jaundice developed and then returned again as the jaundice subsided. Hypophysis extract seemed to combat insomnia effectually and also proved useful in a case of periodically recurring functional angina pectoris of vasomotor origin. As the attacks returned regularly ten days before the menstrual period he assumed that ovarian functioning was responsible for them, and hence aimed to give the antagonistic hormone in hypophysis treatment. Its action on the heart is the more striking as it contracts the coronary vessels instead of dilating them like epinephrin.

88. **Anal Fissures.**—Schilling relates that only nineteen were females in his forty-six cases of anal fissure. In bottle infants with lime-soap stools, the resulting fissures usually heal under addition of carbohydrates to the food. Superficial fissures heal under a protecting salve containing a little anesthetic. Others may heal under Peruvian balsam or ichthyol. He disapproves of caustic applications, and combats the spasms and constipation by injecting a local anesthetic into the muscle below the tear. Glycerin suppositories are irritating; he prefers a pint of soapy water or soda-oil introduced through a soft tube with a number of openings. Twice or once a day he injects into the rectum some astringent, 150 c.c. of a weak solution of tannin or 1 c.c. tincture of krameria in 200 c.c. warm water, or 0.25 per cent. solution of copper or zinc, the patient lying on his left side and straining to expel all the fluid. This exercise in straining while reclining helps to relax the sphincter. Later he applies a little balsam or ichthyol. There must be no straining at stool, as this congests hemorrhoidal nodules. The accompanying nervousness must be combated likewise. With patience and perseverance the fissures gradually heal over under this treatment, as a rule, the tear filling up with scar tissue.

### Policlinico, Rome

*September 12, XXII, No. 37, pp. 1229-1260*

89 Favorable Impressions of Serotherapy in Measles; Eight Cases. (La cura del morbillo col siero de morbillosi convalescenti.) U. Majoli.

*September 19, No. 38, pp. 1261-1296*

90 Present Status of Malaria. (Le moderne conquiste della clinica della malaria.) V. Ascoli.

*September 15, Surgical Section No. 9, pp. 413-460*

91 Case of Hernia of Diverticulum of Meckel. (Contributo alla casistica delle ernie diverticolari e del "Littre.") C. Scandola.
92 Improved Technic for Ventral Herniotomy. (Semplificazione di tecnica nelle laparoplastiche per sventramenti post-laparotomici con applicazione alla cura radicale delle ernie ventrali.) G. Trotta.
93 Mixed Tumors of the Palate. G. Morone. Continued.

## Riforma Medica, Naples

*September 11, XXXI, No. 37, pp. 1009-1036*

94 *Ataxia in Walking and in Swimming. (L'atassia nel cammino e nel nuoto.) A. Murri.
95 Coagulation Reaction in Diagnosis. (Di una speciale reazione di coagulazione del siero di sangue in condizioni normali e patologiche.) S. Seigliano.

*September 18, No. 38, pp. 1037-1064*

96 Immunization and Anaphylaxis in Experimental Glucosuria. A. Ferrannini.

94. **Ataxia in Walking and Swimming.**—A. Marina of Genoa has recently published a work on posttyphoid nervous affections, in which he relates that a typhoid patient was left with acute ataxia but was able to swim perfectly, notwithstanding his inability to walk. Murri discusses the mechanism of ataxia and the functioning of the cerebrum and cerebellum involved, saying that Marina's case seems to throw light on some of the obscure points in our knowledge of ataxia.

## Russkiy Vrach, Petrograd

*XIV, No. 28, pp. 649-672*

97 Lobulation of the Liver, Spleen and Lungs of a Man; Resulting Cleavage and Separation into Parts, with Study of Embryology of these Organs. N. A. Batuieff. Commenced in No. 27.
98 Splenectomy for Floating Spleen; Nine Cases. V. P. Jilinskaya.
99 Unfavorable Experiences with Chemotherapy of Fibrinous Pneumonia. L. P. Dmitrenko.
100 *Foreign Body Several Years in Bronchus. V. I. Telega.

*No. 29, pp. 673-696*

101 *Pathologic-Anatomic Changes after Death from Asphyxiating Gases. I. T. Pojarisky.
102 Femoral Arteriovenous Aneurysm with an Osseous Sac. N. A. Bogoraz.
103 Care and Transportation of the Insane among the Troops in Active Service. N. N. Reformatsky.
104 Formation of Stone in Bladder around a Shrapnel Fragment. S. N. Lissovskaya.
105 *Neutralization of Acid Stomach and Intestinal Contents. A. M. Zaitzeff.
106 *Treatment of Poisoning with Caustic Substances. J. G. Dillon.

100. **Nut in Bronchus.**—Telega gives the history of a patient who had had a nut in the bronchi for six years. The symptoms from it were those of advanced tuberculosis. The foreign body was finally coughed up, but the patient soon died from pulmonary hemorrhage.

101. **Pathologic-Anatomic Effects of Poisonous Gases.**—Pojarisky studied the pathologic changes from asphyxiating gases in forty cases; in six cases after an interval of from twelve to thirty hours, in twenty after two or three days, and in fourteen cases from three to eleven days after the asphyxiation. The principal changes that occurred within twelve hours after asphyxiation were marked edema of the lungs and partial atelectasis, and severe changes in the blood, especially in Bizzozzero's blood plates and in the walls of the vessels, the endothelium. The red corpuscles suffer but little. Owing to these changes in the blood, substances form which increased the coagulability of the blood, rendering it thick and unable to circulate. In many cases there was formation of white adherent thrombi. The blood changes and thrombi formation render the work of the heart very difficult, and the nutrition of the tissues suffers, which leads to asphyxia and death from pulmonary edema. Miliary hemorrhages in the brain are very frequent. After three days complications may arise, such as putrid bronchitis, partial pulmonic gangrene, pleurisy, embolism, hemorrhagic infarcts, etc. These complications may lead to permanent disability even if there is recovery from the asphyxiating gases.

105. **Mechanism of Neutralizing the Acidity in Stomach and Intestine Contents.**—Zaitzeff studied the mechanism of neutralization of the acid stomach and intestine contents on five dogs with gastric, duodenal or intestinal fistulas. Altogether, twenty-eight experiments were made, of which four were done on a dog with a pyloric fistula. He found that the neutralization of the acidity in the stomach is done by the pancreatic juice, which is also responsible for the neutralization of the acidity in the upper portion of the small intestine. In the lower portion this is accomplished by the intestinal juice and mucus. The acid fluids (contents) having been neutralized, are absorbed all along the small intestine, and do not reach the end of the latter. The source of chlorin in the stomach is the pancreatic juice, as the proportion of chlorin increases in the stomach when acids not containing chlorin, such as acetic, sulphuric or lactic acid, are introduced into the stomach. The less concentrated the acids introduced into the stomach, the lower becomes its acidity. In the pyloric portion of the stomach the acidity is lower than in the fundus, because of the presence of the pyloric alkaline juice. After introduction into the stomach of acid fluids, the stomach content acquires the properties of trypsin digestion, that is, proteins are digested in an alkaline medium. This also shows that pancreatic juice gets into the stomach under such circumstances.

106. **Treatment of Poisoning from Caustic Substances.**—Dillon obtained excellent results in the treatment of poisoning with caustic substances such as glacial acetic acid, phenol, ammonium chlorid, sulphuric acid, etc., from lavage of the stomach always preceded by a hypodermic morphin injection to relieve the shock. The esophagus must be soothed and not irritated, which he realized by giving the patient by mouth pure olive oil, 200 gm. in twenty-four hours, keeping this up for seven or eight days if necessary. This was followed later by sweet cream, raw eggs, mucilaginous substances and butter, and gradually ordinary solid food is resumed. Water can be given in the form of rectal injections of normal salt solution, 100 or 150 gm. every two hours, or by the drop method. In addition the mouth should be kept clean, rinsing the mouth with some antiseptic solution, preferably hydrogen dioxid. Of 120 patients thus treated only one died. Three others did not reach the hospital until moribund and the treatment could not be carried out.

## Hospitalstidende, Copenhagen

*September 8, LVIII, No. 36, pp. 901-924*

107 Disinfection of Sputum in the Home. (Om desinfection i Hjemmene af Tuberkulpses Ekspektorat.) K. Schroeder.

*September 15, No. 37, pp. 925-948*

108 Homogeneous Blending of Air in the Lungs. (Om Lungeluftblandingens Homogenitet. Undersøgelser i Anledning af Krogh & Lindhards Methoder til Bestemmelse af Hjærtets Minutvolumen.) C. Sonne. Commenced in No. 36.

## Hygiea, Stockholm

*LXXVII, No. 16, pp. 897-960*

109 *Pathogenesis, Treatment and Prophylaxis of Mercurial Stomatitis. (Om kvicksilverstomatiten.) J. Almkvist.

109. **Prevention of Mercurial Stomatitis.**—Almkvist has published a number of works on this subject since his first report of experimental research in the *Nordiskt Medicinskt Arkiv* in 1903. This stomatitis develops only when the blood contains mercury in a form that combines with albumin on and around the teeth to form an irritating compound. Prevention must be directed to keeping the cracks and crevices of the mouth clean of albumin. The tooth powders used must be of absolutely soluble material so that nothing be left to get into crevices, and all tartar must be carefully removed. Treatment should aim to sterilize all the crevices and he uses a syringe with long fine tip to force the disinfectant into the crevices. He has found hydrogen peroxid especially effectual when used freely in this way. If this is done now and then during the course of mercurial treatment, even the predisposed may be saved from stomatitis.

## Ugeskrift for Læger, Copenhagen

*September 9, LXXVII, No. 36, pp. 1429-1468*

110 Quantitative Determination of Uric Acid in the Blood. (Bestemmelse af Blodets Urinsyremængde.) C. Jørgensen.
111 Roentgen Findings in Normal Large Intestine. II. T. E. H. Thaysen. Concluded.